

Section 3

Exploration for Oil and Gas



3. Exploration for Oil and Gas

This section examines your rights when a company wants to conduct a seismic survey on the land you own or occupy. It details the many steps of geophysical exploration and provides guidance on negotiating permits, offering input as a landowner or a lessee, understanding potential risks and implications of seismic operations for your land, and lodging complaints.

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3.1 Overview of geophysical exploration

Geophysical exploration aims to discover whether saleable mineral resources lie beneath the land surface. Companies may conduct seismic surveys and drill test holes, or use other techniques that provide subsurface information.

Geophysical exploration is now regulated by the Alberta Energy Regulator (AER), governed by the Exploration Directive, in addition to the Exploration Regulation.¹

In seismic surveys, vibrations are sent through the ground using either dynamite charges placed below the ground in shot holes or large trucks that vibrate heavy plates on the ground (vibroseis). Data is recorded using geophones, either in 2D along a single line or more commonly in 3D across multiple lines. See Figure 3.

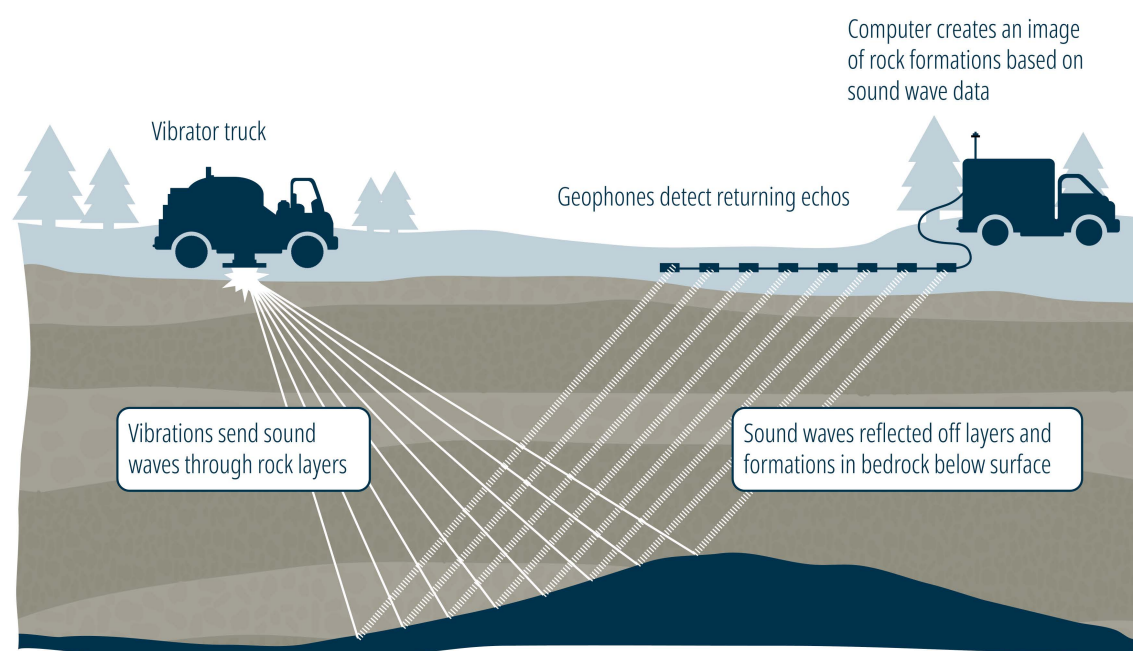


Figure 3. Schematic of exploration activities using vibroseis

3.1.1 Access to land

On private property

Since 1948, land in Alberta has been divided into two zones. The White Area (settled portion) includes lands best suited to agriculture and consists of the populated central, southern and

¹ Alberta, *Exploration Directive* (2025). <https://open.alberta.ca/publications/exploration-directive>
 Alberta, *Exploration Regulation*, 284/2006, s. 11. https://open.alberta.ca/publications/2006_284

Peace River areas of the province. Making up about 42% of land in the province, most of the White Area is owned by individuals. The Green Area (forested portion) makes up the remaining 58% and largely consists of Crown lands.² This section focuses on seismic exploration rules that apply to the White Area, with some guidance on leased land in the Green Area.

A company that wants to conduct seismic activities in the White Area of the province³ will first send a permit agent to negotiate with the landowners and occupants. The permit agent should provide these parties with information that explains what seismic surveys involve and who to contact with a problem, query or complaint. Further information on seismic activity can be found in *Geophysical Exploration and Landowners' Rights*.⁴ A seismic operator is not allowed to enter private property unless the landowner or occupant (or that person's agent) gives permission. The landowner/occupant has the right to refuse access for seismic exploration.⁵ In the case where land is under an agricultural lease agreement, the permit agent must obtain the permission of the landowner, as well as that of the leaseholder, since the seismic activity might cause impacts that last beyond the lease period. It is recommended that the agricultural lease include details on how a negotiation with a seismic company should be handled to make sure lessees' concerns and constraints are heard. In any case, the landowner has exclusive right to refuse the geophysical operations and the seismic operator has no appeal, except in the case of carbon capture and storage.⁶

Notification of activity

Permit agents are required to notify residents and landowners within 400 m of any proposed seismic line at least 48 hours before activity starts in the White Area of the province.⁷ Nearby landowners may want to request a pre-seismic test of the water quality and flow rates in their well.

² Alberta Agriculture and Forestry, *Sustainable Forest Management: 2015 Facts & Statistics* (2017). [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/formain15744/\\$FILE/2015-General-Boundary-Information.pdf](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/formain15744/$FILE/2015-General-Boundary-Information.pdf)

³ Alberta, *Green Area and White Area with national parks and forest management units* (2022). <https://open.alberta.ca/publications/green-and-white-area-with-national-parks-and-fmus>

⁴ Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights* (2025). Appendix A includes a sample permit form. <https://open.alberta.ca/publications/geophysical-exploration-landowner-rights>

⁵ The right to refuse access applies only to seismic exploration; it does not apply to land surveys, access to construct a well or pipeline, or geophysical operations associated with carbon capture and storage, including monitoring. Also, it applies only to privately owned land, not to agricultural leases on public lands. In the event access is refused, the company has no appeal. However, it may decide to conduct exploration around the lands by using road allowances.

⁶ Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*, 2.

⁷ Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*, 2.

The eight steps of seismic exploration

1. The landowner is approached by the seismic company and a permit is negotiated and signed between the two parties.
2. Access routes are established (using existing gates and/or by cutting fences as specified in the permit).
3. Seismic lines are defined and cleared of brush and/or snow using a method authorized by the landowner.
4. Markers are placed along the length of each seismic line. The position of each marker is surveyed using a global positioning system (GPS).
5. If the project uses an explosive energy source, shot holes are drilled and dynamite is loaded down each hole.
6. Recording devices known as geophones are placed on the ground surface according to the markers placed by the survey crew.
7. Vibrations are generated by detonating each shot hole in sequence (dynamite survey) or by positioning surface energy equipment (vibrators) on the seismic line and applying that type of surface energy in sequence. The energy waves, reflected back by the subsurface formations, are picked up by the geophones and relayed to the recording truck.
8. Shot holes are plugged and sealed, compensation to the landowner and/or the leaseholder is paid, and the Geophysical Operations Release form is signed.

3.1.2 Setbacks

A company must follow requirements for setbacks — the minimum distances that seismic shot lines and test hole drilling must be from buildings, water wells, irrigation works, oil or gas pipelines, wells, etc. The actual setback depends on whether explosive or non-explosive operations are being conducted and, in the case of explosives, the size of the charge. The required distances are set out in the Exploration Regulation and the Exploration Directive.⁸ Companies are allowed to conduct seismic exploration within the minimum setback distance if they meet certain conditions: the company must use a reduced charge and must obtain the written consent of the owner for any explosive exploration or test hole that is less than 180 m from a structure or a water well, and for any non-explosive exploration that is less than 100 m from a water well.⁹

⁸ *Geophysical Exploration & Landowners' Rights*; also in Exploration Directive, section 15, "Distance Requirements."

⁹ More information on water wells is provided in section 7.4.1.

Although a setback of 15 m is required for domestic septic tanks and mounds, landowners may ask for a smaller charge size close to any septic systems as these are very sensitive to vibrations caused by seismic testing.

3.1.3 Plugging of seismic holes

This section only applies when the seismic operator uses explosives charges.

As soon as a seismic hole is drilled, it must be marked with an approved permit tag facing the shot hole and displayed less than 10 m from it. The tag shows the permit number of the geophysical contractor and the exploration approval number.¹⁰

After an explosive charge is loaded, the hole must be plugged. For identification purposes, the plug is marked with the licence or permit number of the company conducting the seismic work.¹¹

The explosive charge that was put into the hole must be detonated within 30 days and then the hole must be permanently abandoned. This includes cutting off the wire that was attached to the charge at ground level and ensuring that the hole is properly plugged.¹²

The Exploration Regulation requires the company to abandon each shot hole immediately after the detonation of the charge (no definition or timeframe is given in the regulations guidance for “immediately”) so that water does not flow to the surface or move from one underground aquifer to another.¹³ Landowners can negotiate with the seismic company to put the plastic plug closer to the bottom of each hole (which may be 15–18 m deep) and fill from the plug to the ground surface with bentonite pellets.¹⁴ This would prevent the flow of surface water through the hole and into an underground aquifer, or the movement of water from one formation to another.

If water or gas is released from the ground when a seismic hole is drilled, the drilling must stop, no explosive must be set, and the company must contain the water or gas to the aquifer or stratum of origin using one of the approved methods.¹⁵ The company must immediately submit a flowing hole report to the Alberta Energy Regulator. Additional precautions must also be taken for the next shot hole; it may be drilled only to a maximum depth that is 3 m less than either the

¹⁰ Alberta, *Exploration Regulation*, s. 55.

¹¹ Alberta, *Exploration Directive*, section 18, “Temporary Abandonment of Shot Holes and Test Holes.”

¹² Alberta, *Exploration Directive*, section 19, “Permanent Abandonment of Shot Holes and Test Holes and Alternate Shot Hole Abandonment.”

¹³ Alberta, *Exploration Directive*, section 19.

¹⁴ Alberta Agriculture and Forestry, Alberta Environment and Parks, *Water wells...that last: A guide for private well owners in Alberta* (2019), 50. <https://open.alberta.ca/publications/9781460143414>.

¹⁵ Alberta, *Exploration Directive*, section 16, “Flowing Holes and Encountering Gas.” The directive mentions one exception to this: when a shot hole becomes a flowing hole before a charge is detonated, the charge is to be shot.

drilled depth of the flowing hole or the point of encounter with water or gas in the previous shot hole.¹⁶

3.2 Compensation

There is no legislated requirement for a company to pay compensation for entry and access for seismic activity since the landowner can deny access. You may want to contact a surface rights or landowner consultant before you sign an agreement on compensation.

It is common practice for seismic operators to offer compensation to all parties affected by the exploration program. This compensation is usually based on the length of the line.

Compensation agreements should be defined similar to any other agreement. You have the full authority to set your own price.

Seismic data is property, but it is difficult to place a lien against it if access payments are delayed; as such, it is advisable to obtain payment before granting access.

The company is liable for any damages it causes. Advice on negotiating with a company is provided in section 1.

Table 3. Your rights around oil and gas exploration on your land

I am the landowner	
What your input is	You can have a word on anything and make the final decision.
Decision process and appeal options	You have the final word. If you refuse access to your land for exploration, the company may decide to conduct seismic exploration from an adjacent property or using a road allowance.
How you can negotiate compensation	You are fully entitled to negotiate compensation; however, there is no legislated requirement that details the amount companies need to compensate.
I lease private land that is not under agricultural lease	
What your input is	The landowner has all rights to negotiate with the exploration company.
Decision process and appeal options	You don't have much say other than talking to the landowner, as this specific case is not detailed in regulation.

¹⁶ Alberta, *Exploration Directive*, section 16.

How you can negotiate compensation	You should ask the landowner to negotiate with the company compensation for the inconvenience and potential damage; it is common practice for seismic operators to offer compensation to all parties affected by the exploration program. This compensation is usually based on the length of the line.
I have an agricultural lease	
What your input is	It is recommended that your rights and compensation in the event of seismic exploration be detailed in the lease agreement.
Decision process and appeal options	It is usually recommended that the lease specify that the landowner has exclusive right to allow or refuse entry upon the land, while the lessee should be granted input regarding details such as access, timing and compensation.
How you can negotiate compensation	The landowner typically receives payment for entry, access and recording. As a lessee, you receive compensation for crop damages and disturbance. If you disagree with the amount negotiated with the company, you can apply to the Land and Property Rights Tribunal, which may review the amount and make a compensation order. ¹⁷ If, after the operations, you notice unexpected damage or destruction (to crops, livestock, buildings, etc.), you can apply to the tribunal for a compensation order. ¹⁸
I lease public or Crown land	
What your input is	Companies need to obtain from the minister of Environment and Protected Areas, or the minister responsible for administering the Public Lands Act, an approval to explore. Once granted, they need to obtain your written consent.
Decision process and appeal options	If you refuse to provide the exploration company with your consent, the company can apply to the Land and Property Rights Tribunal for right of entry. If you have an operational or land-use concern, you can request a review by a local settlement officer, who will facilitate a negotiation between parties. If the negotiation fails, the officer makes an adjudicated determination. Under certain conditions, you can appeal the officer's decision by making a request to the Provincial Exploration Review Committee, which may also seek to facilitate an agreement. The committee should render a binding decision within 10 working days. ¹⁹
How you can negotiate compensation	It's common practice for seismic operators to offer compensation to all parties affected by the exploration program. This compensation is usually based on the length of the line.

¹⁷ Alberta, *Exploration Dispute Resolution Regulation*, 227/2003, s. 20.
https://open.alberta.ca/publications/2003_227

¹⁸ Alberta, *Exploration Dispute Resolution Regulation*, s. 22.

¹⁹ Alberta, *Exploration Dispute Resolution Regulation*, Part 1.

3.3 Questions to ask before granting right of entry

Before granting right of entry to your property by signing a permit agreement, you should find out exactly what is involved.²⁰ Here are some issues you may want to address in your written agreement with the company:

Background

Where is the seismic activity planned on the property?

Ask to see the area on a map and on an aerial photo, if one is available. You can also see the area on Google Maps (or equivalent service) if the company provides you with the geographical coordinates of the line(s).

What type of equipment will be used?

Heavy equipment can compact the soil and impact crop growth in future seasons, especially if the ground is not frozen at the time of exploration. For this reason, it is important to minimize the area affected by equipment. Compaction can be reduced if the company uses vehicles that have low ground pressure tires or tracks. Where appropriate, you may wish to negotiate the kind of equipment to be used.

Will helicopters be used to deliver equipment?

Helicopters might be used to reduce the amount of clearing needed for surveying and crew access. If noise from helicopters is likely to disturb livestock, the animals should be moved.

Are the source points placed to respect minimum distances from structures such as buildings, water wells, dams or septic tanks?

You may want to negotiate with a company to keep the source points of seismic waves farther away than the minimum setback distances required by the Exploration Regulation.

When will the seismic work be conducted?

Seismic crews often work day and night, seven days a week.

After an agreement has been signed, how soon will the work start?

Ask when the work will be done and discuss any concerns you have about the timing.

²⁰ In this section, “you” is used to refer to the landowner or occupant.

Land

What will the company do to prevent disturbing the soil with equipment?

If the topsoil is damaged, it may take longer for the site to restore itself.

How many fence lines will be crossed?

It may be preferable to give the company permission to cut and repair fences, rather than have the seismic crews travel across much longer routes to use gates. A shorter route will minimize surface damage and soil compaction that can be caused by heavy equipment.

As a landowner, you may want to negotiate compensation for any fence cuts and repair the fence cuts yourself to ensure that the repairs are completed to your satisfaction.

Can any sensitive land be avoided?

Susceptible land (e.g., a spring-fed dugout, steep slopes subject to erosion) can be placed off-limits; the company can be asked to offset their survey line around the area.

Can the clearing of trees be minimized?

Companies may be able to reduce the width of the survey line to 1.5 m by drilling shot holes from special all-terrain vehicles and hand-clearing receiver lines. Make sure that the width of seismic line is indicated on the contract, as it may be up to 5 m.²¹

In forested areas, clearing and cutting straight lines increases the vulnerability of wildlife to predators and hunters and has a visual impact. The line of sight can be reduced by setting out a meandering line.

Will the route go through any trees?

Find out whether it is possible to realign the seismic line or offset it around the trees if you want to keep them.

Will the company use wooden flags?

Wire pin flags are not allowed for seismic operations on private land in Alberta unless the landowner/occupant gives permission. Their use should be refused since normal farming activities, such as making silage or hay, can shred wire pin flags left in the fields and can result in injury or death to livestock that eat the feed.²²

²¹ Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*, 3.

²² Alberta, *Exploration Directive*, section 14, "Use of Products in Exploration," lists all approved seismic survey markers.

Water

Will the company test your water well before and after the seismic activity?

A test before seismic activity will provide a baseline should problems arise later. Ask to obtain a copy of the results.

Will the line be kept away from ditches and low-lying land?

This will prevent surface water and pollution from entering the seismic holes.

How will shot holes be plugged?

You may want to negotiate with the company to put the plug close to the bottom of the hole instead of the standard requirement of 1 m below the surface.

What will be done with the drill cuttings?

Any drill cuttings left over after plugging the hole will usually be spread on the surface, but occasionally landowners want them removed.

Will the company leave the land in the same condition as when they entered it?

It is best if all waste is removed. Burning the waste is often preferred by companies, and low temperature burning affects air quality.

Will the company fill any flowing shot holes?

Though a company is legally required to ensure that all shot holes are properly plugged (including any that may have blown out) to prevent any release of water,²³ it is advisable that this requirement be explicitly stated in the permit agreement. Flowing holes have occasionally caused problems for landowners.

Will the company need to return in spring to clean up after winter operations?

You may prefer to ask if the company will pay you to carry out the cleanup operations. It is important for the landowner to conduct their own check, even when the company does the cleanup, to ensure that fences are intact, holes have been properly filled and no materials remain that could injure livestock.

How much compensation will you be paid?

Compensation should include money for crop loss, fence cuts, destruction of trees, or other adverse effects on the land.

Do you need a special condition to restrict access to certain locations?

Although the working operations are limited to the area specified on the permit form, a company may cross other lands for access.

²³ Alberta, *Exploration Directive*, section 19.

Do you need a penalty clause in the agreement?

If the company has agreed to conditions beyond the legal requirements, you will have to enforce them yourself. It is difficult to enforce special conditions without a penalty clause, although this may not be easy to negotiate.

Have you included all agreed-to items in a written attachment to the permit form?

It is important to have everything in writing. This may include the way in which operations are conducted and their timing.

If you agree to provide access, you will be asked to give written consent. A standard permit form, Permit to Conduct Geophysical Operations, should be used.²⁴ This form was developed by the Canadian Association of Geophysical Contractors, in association with the Farmers' Advocate Office and other government and industry bodies.²⁵ The permit should describe exactly where and when seismic activity will occur and indicate the amount of compensation to be paid by the company.

Include everything you want the company to do, and everything you want to ensure the company does not do, as written conditions in the permit agreement. You may want to execute an addendum to the permit if you need more space to list these. If you do so, it is imperative that the permit refers to the addendum.

When the seismic exploration is finished, be sure to review all seismic lines, checking to ensure that holes are properly plugged and that cleanup is complete (or scheduled to be completed) before signing the Geophysical Operations Release form.

3.4 Refusing permission for access

If, as a private landowner or occupant, you do not wish to have seismic activity take place on your land, you can refuse permission. In such a case, the seismic company is not allowed to enter the land and has no right to appeal. If a company comes onto your land when you have refused permission, it can be fined up to \$25,000²⁶ and you can treat it as an act of trespass. You can ask a geophysical inspector to investigate (section 3.2), and can take the company to court to recover the cost of any damage.

²⁴ The permit form should be provided by the seismic operator. A sample of the form can be found in Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*, Appendix A. <https://open.alberta.ca/publications/geophysical-exploration-landowner-rights>

²⁵ For information on the Canadian Association of Geophysical Contractors, see Appendix B.

²⁶ Alberta, *Exploration Regulation*, s. 1(2).

If a company wants to conduct seismic testing on a leased roadway, they must first negotiate with the tenant. However, if negotiations fail, the company is permitted to use a leased road allowance (developed or undeveloped) for seismic testing.²⁷ In this case, the company must give written notice to the tenant 48 hours before entering the road allowance. This notice must state where the points of entry will be and that the company will be liable for any damage resulting from exploration activity.

3.5 Complaints

As a landowner/occupant, it is important for you to inspect for compliance when a seismic line is put across your land. If you have concerns, first try to resolve them with the seismic company. It is advisable to obtain the name and company of the chief surveyor for the project. If there are concerns over the crew, first attempt resolution with the chief surveyor. Surveyors are also a registered profession and have a complaint process; contact the Alberta Land Surveyors' Association for details.

If your attempts with the seismic company are unsuccessful, you can call the AER's Energy and Environmental Emergency 24-hour Response Line at 1-800-222-6514.

Note that if you have negotiated specific requirements with the company (in addition to legal requirements), you will need to enforce these specific requirements yourself. Ideally you should inspect the area with a representative from the seismic company, document the problems, and send your written account (with photographs or videos, if appropriate) to the company.

If you have a problem with a water well that you believe to be caused by the seismic operations, you should first contact the seismic company using the contact information available on the permit form or the 400-metre notification information. You can also contact the Energy and Environmental Emergency Line (1-800-222-6514) and ask for a thorough investigation to determine the cause of the water well problem.²⁸ If this remains unresolved, you may also contact the Farmers' Advocate Office to inquire about having your well inspected, repaired or replaced under the Water Well Restoration or Replacement Program.²⁹

Should you have concerns about the conduct of a permit agent, you can report this to the Canadian Association of Geophysical Contractors, to which many seismic companies belong (Appendix B).

²⁷ Alberta, *Exploration Regulation*, s. 10.

²⁸ Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*.

²⁹ Farmers' Advocate Office, *Well Water Replacement or Restoration Program* (2024).
<https://open.alberta.ca/publications/well-water-restoration-or-replacement-program-wwrp>

3.6 Adjacent landowners and occupants

You may be concerned about possible impacts on your land or water supply from seismic activity occurring on adjacent property. Companies are required to notify all residents within 400 m of any planned seismic operations at least 48 hours before the activity starts.³⁰ The notification can be made to each individual residence or using signs or through a public announcement. The notification must contain the name of the seismic operator, a contact name and phone number, as well as a description of the energy source.³¹ If you are concerned that your water supply may be affected, ask the company to test your well, or have it tested by a professional laboratory. This will provide you with baseline information on quality and flow of the water before the seismic testing starts.

If you have concerns or questions about the impacts of local seismic operations on your water well, or any other problems related to the seismic activity, contact the AER and ask for an investigation.

A company must notify a municipality, in writing, of their intention to conduct seismic operations before they apply to the AER for a licence.³² When undertaking exploration on primary or secondary highways, the company is required to notify the operations manager for the minister of Transportation.³³

Even if your land is not within the notification area, you can contact the company and draw its attention to any concerns you have and request that these be addressed before the seismic program starts. If you want information about a specific exploration program, you can make a request in writing to the AER.³⁴

³⁰ In the White Area of the province. Farmers' Advocate Office, *Geophysical Exploration & Landowners' Rights*, 2.

³¹ Alberta Energy Regulator and Alberta Forestry and Parks (2024), Master schedule of standards and conditions, <https://open.alberta.ca/publications/master-schedule-of-standards-and-conditions>

³² Alberta, *Exploration Directive*, section 6, "Application for Exploration Approval."

³³ Alberta, *Exploration Directive*, section 11, "Notice to Relevant Land Authorities and Holders of Forest Management Agreements and Timber Licenses."

³⁴ Alberta, *Exploration Directive*, section 4, "Release of Program Information."

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