

## **The Oil and Gas Industry in Alberta: Drilling and Production**

### **Impacts on forest structure and integrity:**

- It is not the impact of individual wells that is of primary concern, but the cumulative impact of all wells. In 2000 alone, 11,898 new wells were drilled in Alberta.
- Assuming an average clearing of 1.0 ha per well site, the cumulative area of existing wells in the Boreal Forest Natural Region, as of 1997, has been estimated to be over 886 km<sup>2</sup>.
- There are no regulations that limit the cumulative ecological impact of wells, no requirement for well sites to be reforested after activities cease, and no requirement for coordinated planning of activities with the forest industry.
- Each well has a road leading to it and frequently a pipeline right-of-way leading away from it. Forest regrowth along these corridors is suppressed for the entire duration of their use. There are no limits on cumulative road densities or pipeline densities.
- The clearing of trees associated with the construction of well sites, access roads, and pipelines is associated with progressive loss and fragmentation of habitat, increased access, and damage to aquatic systems (see fact sheet on seismic). Well sites, roads, and pipeline right-of-ways are essentially permanent features of the landscape, given their prolonged use and absence of reforestation requirements.
- In heavy oil fields and in-situ oil sands oil production generally involves steam-assisted gravity drainage which uses parallel pairs of horizontal wells for steam injection and oil recovery. Steam recovery is far more intensive than conventional oil extraction because it involves batteries of wells in close proximity, it requires large quantities of water and power for generating steam, and it makes extensive use of 3-dimensional seismic surveys.

### **Contamination of soil and water:**

- Sources of soil and water contamination include:
  - Oilfield waste disposal by spreading on land and roads (both are officially condoned practices, with minimal oversight);
  - Underground leakage during drilling due to faulty well casings;
  - Spills and continuous leaks during operations;
  - Faulty storage structures;
  - Improper transport and disposal of wastes;
  - Pipeline failures.
- Soil and water contaminants include the following products:
  - Drilling mud and associated chemicals and minerals;
  - Subsurface products including oil, saline water, and heavy metals;
  - Concentrated acids used for well stimulation and other process chemicals;
  - Industrial fluids (solvents, fuel, lubricants, etc.);
  - Sewage and garbage.

**Air quality impacts:**

- Drilling and production are also associated with reductions in air quality through the release of various of gaseous emissions. Some of these emissions, such as benzene and carbon monoxide, are directly toxic. Others, such as sulphur dioxide and nitrogen dioxide, are responsible for acid rain deposition.
- Methane and carbon dioxide are important greenhouse gases. Alberta has the highest greenhouse gas emissions in Canada, largely as a consequence of energy-sector activities.
- Sources of gaseous emissions include:
  - Leaking and flaring of gas produced as a byproduct of oil production;
  - Well blowouts ;
  - Glycol dehydrators, used to remove water vapour from the gas stream (primary source of benzene emissions);
  - Test flaring of new gas wells;
  - Flaring of gas and sulphur recovery at gas processing plants;
  - Inadequate storage and handling facilities;
  - Oil spills and leaks and disposal of oil wastes via spreading on land and roads;
  - Pipeline failures.

**Best practices:**

Well sites, pipelines, and access roads can only be incorporated into ecological forest management through explicit limits on cumulative densities. The limits need to be defined on the basis of best-available scientific knowledge regarding the impact of the specified activity on wildlife and the overall ecological integrity of the forest. Achieving these limits will require: (1) integrated planning with the forest industry, (2) the development and implementation of new operating practices, and (3) a reduction in the pace of development.

Practices that will need to be implemented to support a reduction in the ecological footprint resulting from petroleum development include the following:

- Coordinated road planning between the forest industry and the petroleum industry (including shared road construction and limitation of public access);
- Increased use of temporary winter roads in place of all-season roads;
- Implementation of remote monitoring and maintenance of wells, permitting the routine removal of roads after drilling is completed;
- Routine use of shared corridors for roads, pipelines, and power lines (preferably utilizing existing seismic lines);
- Coordinated operational planning with the forest industry so that well sites are preferentially placed on clearcuts instead of stands of mature forest;
- A reduction in the size of clearings for well sites and other facilities;
- A reduction in the number of well sites through increased use of horizontal drilling and slower exploitation of the resource;
- Reforestation of all clearings as soon as they are not being used, to defined reforestation standards.