Well Decommissioning 101

Wondering what happens when a wellbore is decommissioned on your land? What steps it goes through and what processes are undertaken to ensure the wellbore is permanently plugged?

The decommissioning of a wellbore goes through several steps, some of which are unseen, and landowners may not be aware of. We've included a brief guide that will provide you with a basic understanding of what is involved and how it is achieved.

What does it mean when a wellbore is abandoned?

Also known in the oil and gas industry as *abandonment*, the decommissioning of a wellbore in Alberta follows strict rules put in place by the Alberta Energy Regulator (AER). The current rules for well decommissioning (Directive 20) have been in place since 2011 and ensure that all wellbores are decommissioned in a safe manner that will ensure the safe permanent closure of the wellsite.

A wellbore is considered abandoned (decommissioned) when it has been deemed safe and secure by the AER. This happens after the wellbore has been permanently shut down, plugged and the wellhead removed.

Whether the wellbore is classified as inactive, suspended or abandoned, it's up to the licensee to take care of decommissioning and reclamation costs. If there is no viable owner, wellbores are managed by the Orphan Well Association with costs covered by an annual levy collected from the oil and gas industry by the AER.

Following decommissioning, the site is remediated (de-contaminated), if required, and reclaimed back to what it was prior to any well being there.

When it comes to the decommissioning process, the wellbore goes through seven basic steps from start to finish. They include file review, landowner discussion, site inspection, engineering program, on-site operations, cut and cap and lastly reporting.

Step #1 – File Review

Once it has been determined that a wellbore is to be decommissioned (either by an operating company or, in the case of an orphan well, by the OWA) the history of the well must be compiled so that engineers will know the best way to abandon the wellbore.

There are numerous government and public data sources that can be accessed that provide important details on a wellbores including when it was first drilled, how deep it is, what formations it produced from, as well as any issues drillers may have encountered when drilling the wellbore. All wells in the province have what is known as a well file. Well files are also reviewed as they provide a complete history of the wellbore, including, drilling, workovers and production history, etc.

During this initial step, regulatory approvals are also completed. The regulatory approval phase can vary in length depending on the specific wellbore. Approvals may include a wellsite decommissioning (abandonment) notice to the AER, non routine wellbore abandonment approvals, access approval from the access rights holder (Road Use Agreement for example) as well as engineering program and vendor selection.

It is important to note, not all of these agreements are required for every site. For example, non routine wellbore abandonment approvals can be applied for and approved during the field abandonment stage. These non-routine approvals may be required where unusual or infrequent downhole wellbore characteristics require additional measures prior to decommissioning.

Project planning is also part of this step where issues within the wellbore are identified such as potential leaks and insufficient cement. Any potential issues identified are repaired in accordance with regulations to ensure the wellbore decommissioning in place is strong and will remain sealed.

Step #2: Landowner Discussion

Prior to any equipment moving to site, the landowner is consulted. In the early stages of discussion, the company or the OWA will confirm access and discuss the work required on your land. Landowner input is important to help crews execute work in the best way possible and with the least amount of disruption to landowners. Landowners may also have important historical knowledge of events at the site and what issues may be present.

Keep in mind, in the case of an orphan well, the OWA may need access to your land at anytime throughout the year, regardless of what agricultural stage your land is in. We simply have too many sites to decommission to always wait for crops to come off for example. We will always strive to limit our activities to the former surface lease.

Throughout the process, the OWA will be in constant communication with landowners, keeping you up to date about what is happening.

Landowners should also be aware that they are entitled to be compensated for unpaid surface rent even if the site is an orphan. However, unpaid rentals are can only be provided by the Surface Rights Board, not the OWA. Landowners who restrict access for decommissioning or reclamation may impact their ability to receive unpaid surface rentals.

Step #3 – Site Inspection

After landowners are contacted to ensure the wellsite can be accessed, a site inspection takes place. If the wellbore is on a larger site or part of a recent operation, access is typically much easier. Older wells that have been out of service for extended periods may no longer have visible access roads. In these cases, the surface lease agreement will be consulted, and the original access utilized.

During the inspection, the overall condition of the wellhead is determined and wellbore pressures are recorded. The wellbore is also checked to see if there are any leaks (gas, oil, or water) that may be occurring. Initial environmental parameters may also be gathered at this stage. This initial environmental review is known as a Phase I Environmental Site Assessment (ESA) and is part of the reclamation process

Step #4 – Engineering Program

In this step, engineers use the information collected in the File Review to develop a detailed decommissioning program for the wellbore. This will outline what type of primary decommissioning equipment is needed (e.g. service rig, drilling rig, coil tubing unit, e-line unit, etc.). It also provides detailed instructions for where to place certain plugs and downhole devises as well as how much and where special cement should be placed.

Step #5 – On-Site Operations (see wellbore schematic image)

This step in the process will involve the mobilization of several pieces of specialized equipment to the site. Typically, a service rig is used for well decommissioning operations, but a coiled tubing unit may also be used in some cases. Smaller operations may use a smaller unit known as a logging unit or "e-line". Other equipment may also be on site including a steamer truck (especially in winter), cement unit, and various transport and service trucks.

First the wellhead is secured and disconnected from any pipelines. The wellhead is then opened to allow certain tools to be lowered down the wellbore. The type and number of pieces of equipment placed on the lease will depend on the complexity of the wellbore. If more information is required on the wellbore, a logging truck may be sited to run several tools down the well. These tools are very specialized and can provide information such as how well cement has bonded to the outside of the casing, if the casing has good integrity, or if there are any leaks in the wellbore.

Any production tubing is removed from the wellbore and sent for re-use or recycling. These "joints" of tubing are each ~10 metres long and are fitted end-to-end with screw connections. Depending on the depth of the wellbore, this tubing "string" can be up to several thousand meters long and made up of hundreds of individual joints.

The inside of the wellbore is often cleaned and any residual oil or gas is removed. This is done to ensure cement plugs that will be inserted into the wellbore bond optimally to seal the wellbore.

The actual plugging of the wellbore takes place during this stage. A devise known as a bridge plug is lowered into the wellbore and placed just above the perforation zone (this is the portion of the wellbore that was previously perforated allowing gas or oil to flow into the wellbore from the formation). Once the bridge plug has been placed and mechanically connected, the seal of the plug is tested to ensure it is secure, and then several meters of cement is placed above the bridge plug. These actions result in the wellbore being "downhole abandoned". The wellbore is left filled with fresh water or other noncorrosive fluid.

Any necessary equipment is also moved in during this step. Semi trailer sized equipment is brought in to set cement below surface and seal the hydrocarbon source(s).

Next, an evaluation for potential shallow issues is conducted. This is to protect ground water and the surface environment. If any issues arise during this stage, certain equipment may return to site and further repairs will be made.

Step #6 – Cut and Cap

Once the wellbore has been permanently plugged downhole, the wellhead at the surface is then cut off and any near surface equipment removed. Wellheads are cut off at least one meter below ground surface (some exceptions apply) to ensure no future issues with cultivation.

Step #7 – Reporting

After a wellbore has been permanently decommissioned, the last step in the process is to electronically report the wellbore status change to the AER so that the wellbore will now appear as decommissioned on provincial databases.

Once the wellbore has been successfully decommissioned, other infrastructure on the site, including pipelines, will be removed and the site reclamation process can begin.

Did you know?

The average lifespan of a wellsite can be upwards of 20-30 years. The life cycle of a wellsite includes 6 main classifications, beginning with active and ending with reclamation. The 6 classifications include active, inactive, suspended, abandoned, orphaned and reclaimed.

Where to find more information

- www.aer.ca/regulating-development/project-closure/suspension-and-abandonment/how-are-wells-abandoned
- www.alberta.ca/surface-rights-rental-recovery.aspx
- www.alberta.ca/agriculture-energy-utilities-and-surface-rights.aspx
- www.pembina.org/pub/landowners-primer-what-you-need-know-about-unreclaimed-oil-and-gas-wells
- www.orphanwell.ca/