

August 14, 2018

Wapiti Area Synergy Partnership

SECURE
energy services



Introductions:

» Glenn Osmak

- General Manager, Op's Support and Integrity (includes Disposal Well Operations)

» Kim Kingsmith

- Manager, Geology

» Chris Walsh

- Manager, Land Services

» Greg Smith

- Director, Government and Stakeholder Relations



SECURE Energy Services

» Who are we?

- Formed in 2007 by establishing oil and gas waste management facilities in the Grande Prairie area
- SECURE has grown to be a leader in customer focused solutions for the oil and gas industry
- Currently over 1000 employees and facilities throughout Alberta, Saskatchewan, Northeast B.C. and North Dakota

» **Within the Processing, Recovery and Disposal Division, our goal has been to supply the oil and gas industry with safe and responsible options to deal with waste generated by oil and gas operations and production**

» www.secure-energy.com



Concerns Relating to Fluid Disposal

» Protection of Groundwater:

- AER Directive 8 – Surface Casing Depth Requirements
- AER Directive 9 – Casing Cementing Minimum Requirements
- AER Directive 10 – Minimum Casing Design Requirements
- IRP #14 – Use of Non-Water Based Drilling Fluids;
- Subject to AER audit and inspection

» Permanent containment of oil and gas waste fluids in the subsurface

» Safe operations

- Wells
- Facilities
- Pipelines

Ground Water Protection

Alberta Base Ground Water Depth Website:

» Alberta has mapped and determined the depth to the deepest useable ground water throughout the Province

<https://dds.aer.ca/BGP/UI/BGP-Main.aspx>

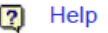
» This website is used to determine the base of ground water at any location in the Province

» This example is in the town of Wembley (4-15-71-7W6): Base Ground Water:

- 168.6 m (554.2 ft) above sea level equates to **556.4 m (1826 ft) depth below surface**

» **Protective surface casing on new wells must be run and cemented in place to a minimum depth to cover the base of ground water protection!**

Base of Groundwater Protection Query Tool



This online tool relays the base of groundwater protection information that was historically contained within ST55: Alberta's Usable Groundwater Base of Groundwater Protection Information. The base of groundwater protection (BGWP) is the best estimate of the elevation of the base of the formation in which nonsaline groundwater occurs at that location. However, local variations in geology and topography are typical, so the actual elevation of the base of the designated formation can often vary from what is provided in the BGWP tool.

Select the value for each DLS component in the drop-down boxes to obtain the base of groundwater protection (BGWP) elevation and the designated protected geological unit for that location.

The BGWP elevation is relative to sea level and is not a depth below ground level. To convert this elevation to a depth below ground level or below kelly bushing (KB), subtract the BGWP elevation value from the ground level or KB elevation.

In any case where the BGWP elevation provided by the query calculates to a depth greater than 600 metres below ground level (mbgl), the BGWP can be defaulted to 600 mbgl. Notwithstanding the default, operators may choose to protect to the base of the designated formation if its base is deeper than 600 mbgl.

If nonsaline groundwater is encountered below 600 mbgl, the AER requests the information be forwarded to AGS-Info@aer.ca.

Further information on the BGWP can be found at [AER BGWP Frequently Asked Questions \(FAQs\)](#) and [AER Bulletin 2007-10](#).

Base of Groundwater Protection Information **556.4 m (1826 ft) depth below Surface**

LSD:	Section:	Township:	Range:	Meridian:	BGWP Elevation (m asl):	Deepest Protected Geological Unit ¹ :
4	15	71	7	6	168.59	WAPITI GRP

¹BGWP includes the Scollard as a member of the Paskapoo as per Irish (1970)

* - Required field

Find

Base of Groundwater Protection (BGWP) elevations are available for all Dominion Land Survey locations in Alberta, at the legal subdivision (LSD) level, with exception of the mountainous region (disturbed belt) and the very northeast corner (see image) of Alberta. The BGWP within the mountainous region is set at 600 metres below ground level.



To view the Base of Groundwater Area map, click on the BGWP Map.

For system specific questions contact the [AER Environment Group](#).
AER Environment Enquiries: (403) 297-8330

Wembley Water Wells Map With Depths

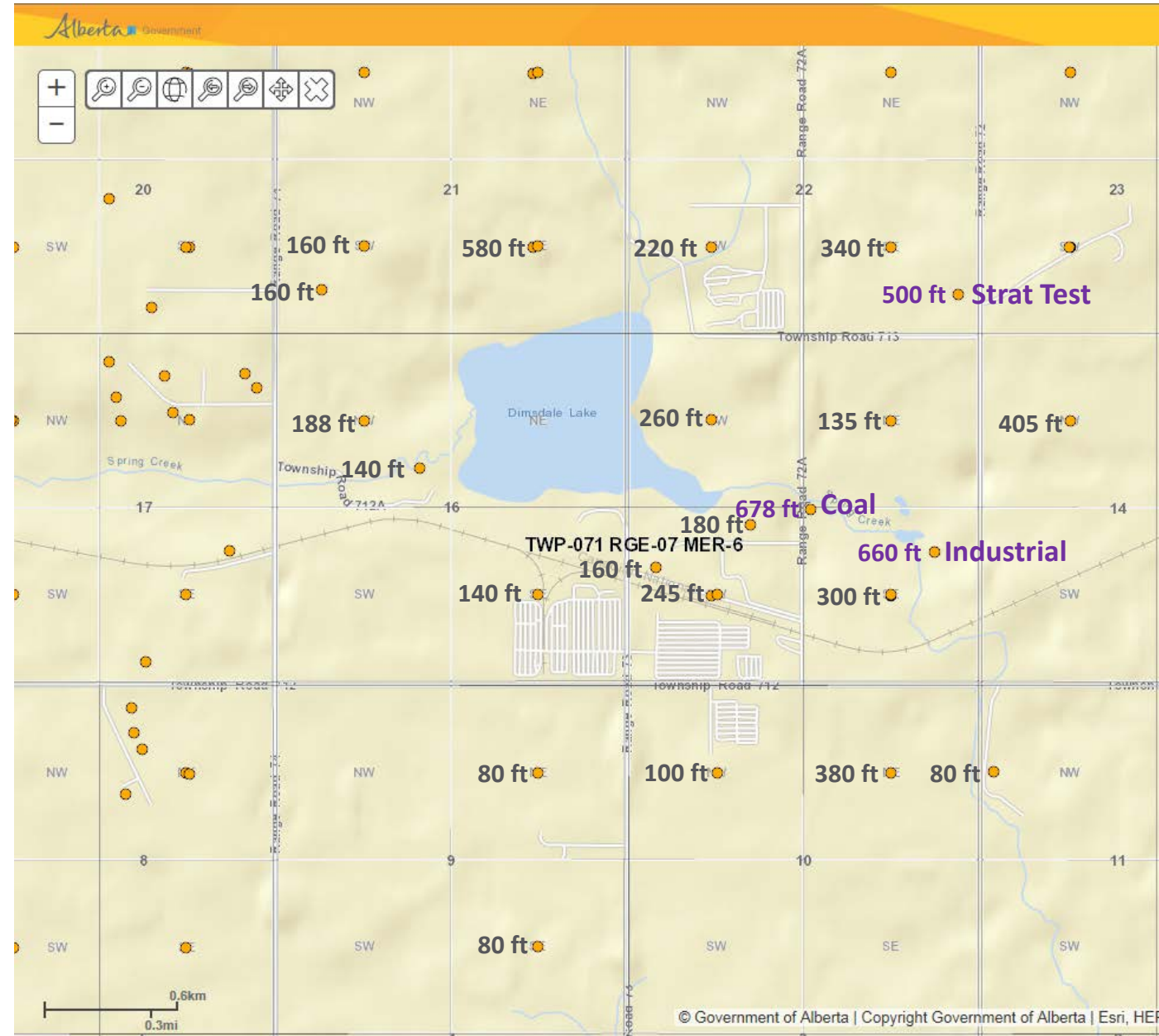
» Alberta Government Water Well Website:

<http://groundwater.alberta.ca/WaterWells/d/>

» Around Wembley water wells range from **80 feet** (24.4 m) to **580 ft** (176.8 m)

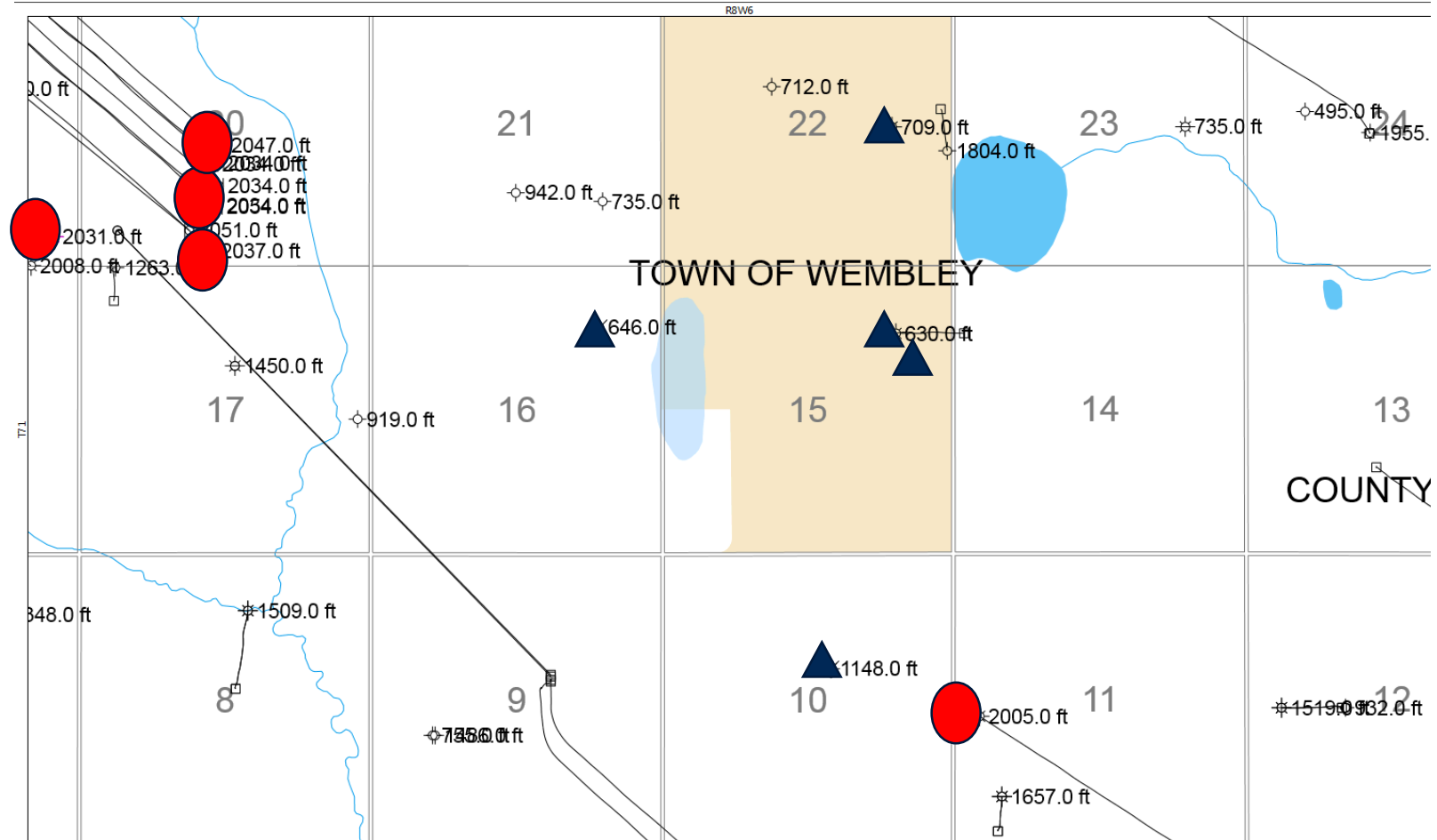
» Base Ground Water Protection is **1826 ft** (556.4 m)

» **ALL new oil, gas and disposal wells must have surface casing set and cemented full-length (e.g. 60 metric tonnes API certified cement) to a minimum depth of 1826 ft (556.4 m)**



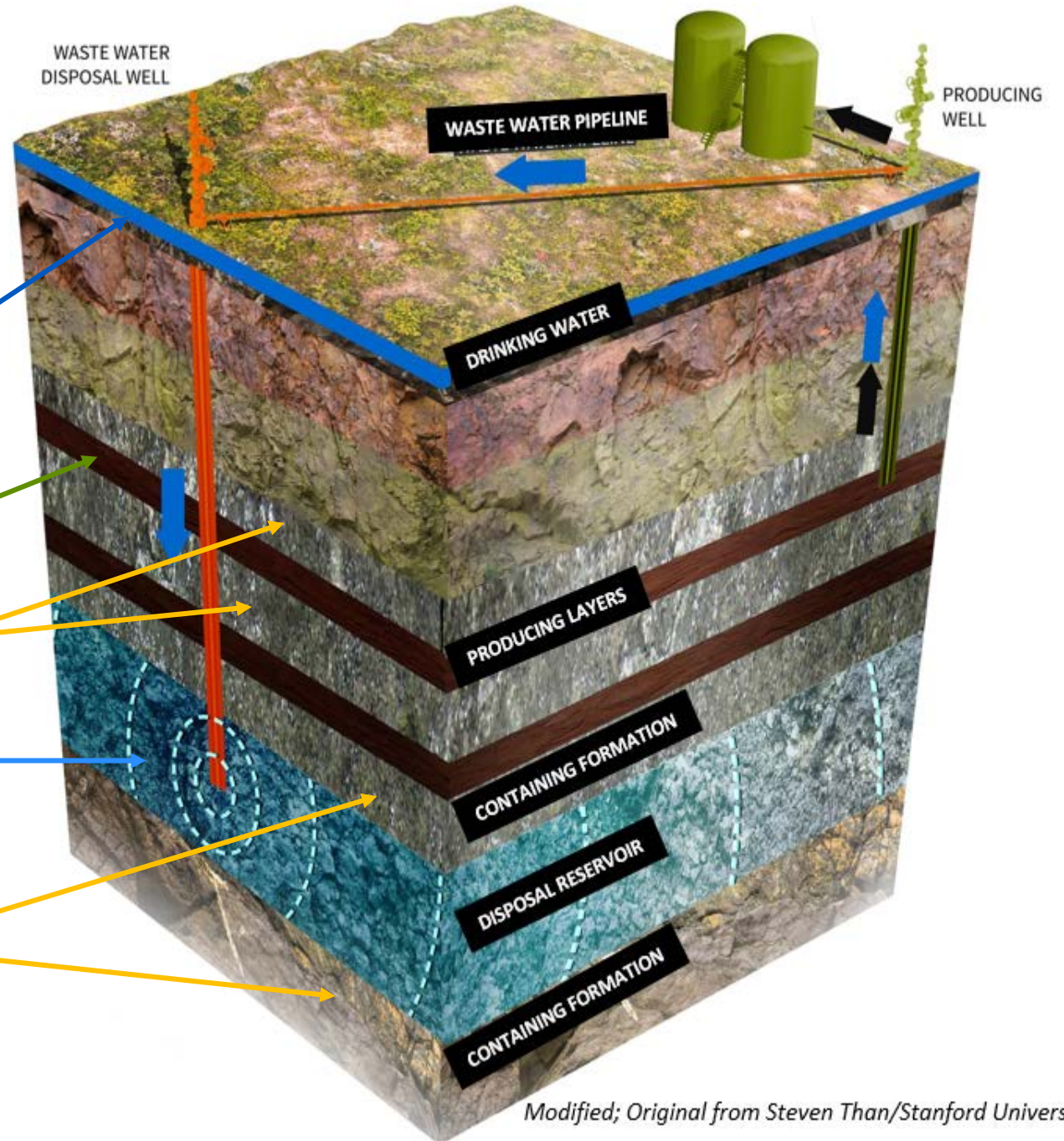
Oil and Gas Wells Drilled With Surface Casing Depths

- » The shallowest existing oil and gas production is about **3500 ft** (1065 m) ▲
- » The new Montney horizontal gas production is from about **8000 ft** (2435 m) ●
- » For the newer recently drilled oil and gas wells, the surface casing has been set below **2000 ft** (610 m)
- » All new oil, gas and disposal wells are required to have surface casing set below **1826 ft** (556 m) – ***and far deeper than ALL the water wells***



Producing and Disposal Wells Below Ground

- » Potable water comes from shallow gravels and rocks with holes in it (porosity) filled with fresh water (less than 4000 ppm)
- » All production comes from rocks with small holes in it (porosity) filled with oil or gas
- » Between the producing zones are formation rock barriers with no holes (no porosity)
- » Disposal zones are formation rock with small holes in it (porosity) filled with salty non-potable water (non-hydrocarbon bearing)
- » Above and below the disposal zone are formation rock barriers with no holes (no porosity) which permanently contain the fluid in the disposal zone



Well Bore Components

» Well Head

- Controls flow and pressures between the well and surface

» Surface Casing

- Run deep enough to **protect ground water** (1,826 ft in Wembley)
- **Fully cemented to surface** for effective containment (Guide 10)

» Production Casing

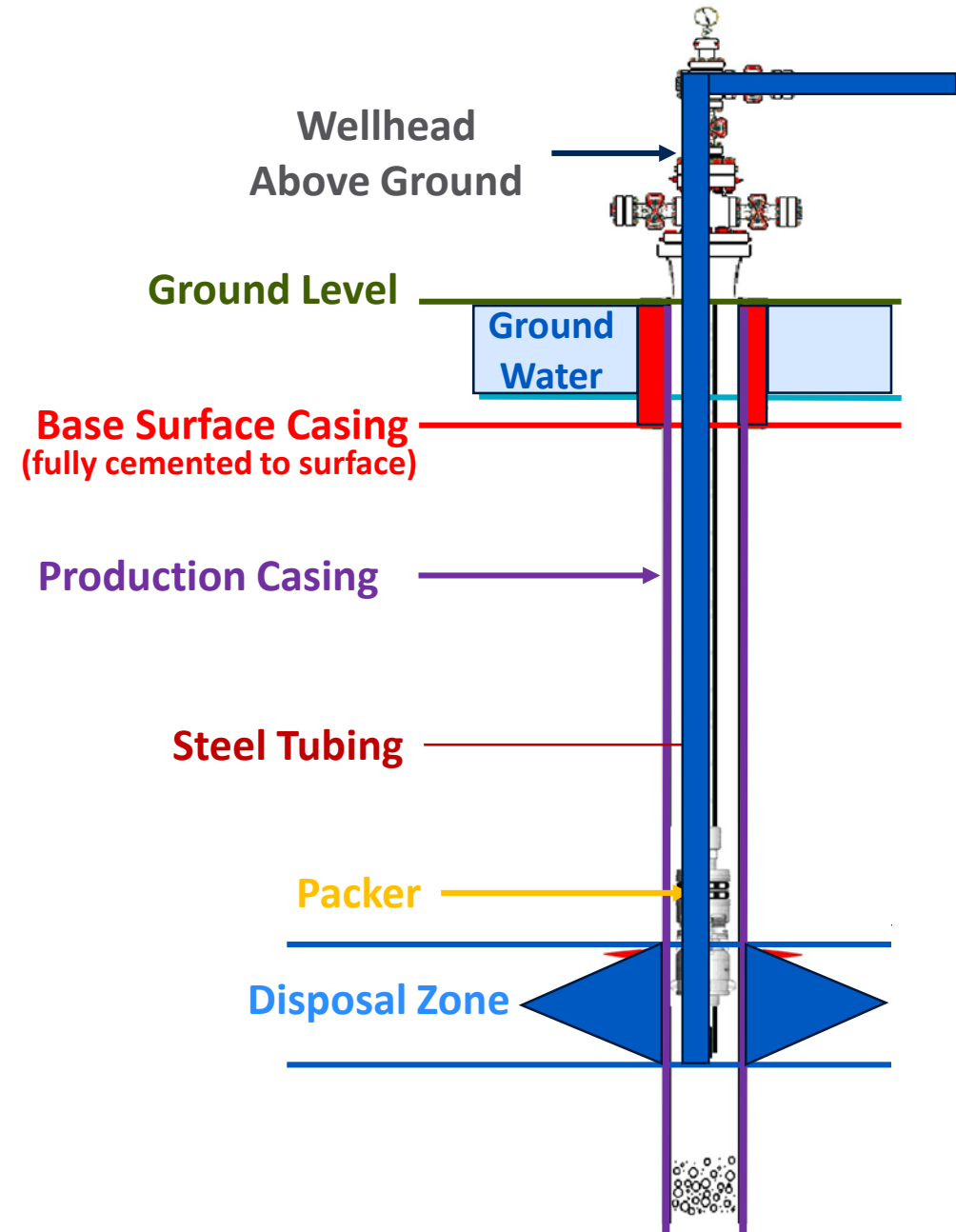
- Steel casing **cemented to surface** (Guide 9 and 10)
- **Segregates and protects all other zones** from the disposal zone

» Packer

- **Separates the disposal zone from the rest of the well bore**, creating an annulus between the tubing and casing filled with inhibited fluid

» Steel Tubing

- Fluid flows down the tubing **directly into the disposal zone**





Alberta Energy Regulator (AER) Directives, Guides & SECURE Standards/Specs

- » AER Enforcement Ladder
- » AER Review and Approval of Applications: Directive 51 (Injection & Disposal Wells) & Directive 65 (Resources Applications for Oil & Gas Reservoirs / Disposal Schemes)
 - Confirmation of disposal zone containment (Cement bond logs, temperature logs)
 - Completions, Logging and Testing Requirements
- » Audits
- » What could go wrong?
 - Tubing Failure (continuous monitoring of tubing and casing pressures)
 - Packer Failure (regulatory requirement to test annually and to repair any failures)
- » Secure PRD Division has developed internal standards and specifications for disposal wells, which exceeds AER requirements to maintain longevity and integrity of the assets
 - Tubing & Packer Specifications & internal protective coatings
 - Commissioning, Start-Up and Well Operating practices



History of Water Well Concerns

- » Alberta Environment & Parks (AEP) has many years of experience with water well problems
- » For approximately 20 years AEP had a team dedicated to responding to water well concerns
 - Team was made up of experienced drillers and a manager
 - Equipped with many tools including down hole cameras and sophisticated sampling capabilities
- » AEP found that ***less than 1%*** of all of the wells responded to had issues that could be traced to oil and gas activity
- » The remaining 99%+ had well maintenance related problems

Solutions For Well Problems





Thank You!