



## GRAVITY INJECTION - WHAT IS IT?

**UICI-IP-2**  
(10/13)

### **Question:**

What is meant by “gravity injection”?

### **Regulatory Background:**

The KDHE Underground Injection Control (UIC) Program by implementation of KDHE regulation K.A.R. 28-46-28 restricts injection of wastewater into Class I industrial wastewater disposal wells to gravity flow, commonly referred to as “gravity injection”.

### **Definition:**

Class I disposal well – means a well that injects hazardous or non-hazardous wastewater into deep rock formations that are separated vertically from the lower most fresh or usable water by many layers of impermeable shales and limestones several thousands of feet thick.

Injection tubing – means a smaller diameter uncemented casing string hung inside the longstring cemented casing and is used to convey the injected wastewater into the disposal formation.

### **Diagram:**

Please refer to attached diagram (Attachment I) which depicts the components of a standard Class I disposal well.

### **Discussion:**

Gravity injection means the formation receiving the wastewater has sufficient permeability, porosity, thickness and horizontal extent to accept the wastewater naturally without the use of artificial pump pressure. The wastewater flows into the well under the force of gravity. The Arbuckle Formation is the disposal zone of choice in Kansas for a number of reasons, including this formation’s capability of accepting large volumes of wastewater by gravity injection.

How does gravity injection work? When a well experiences gravity injection this means the injection fluid is actually cascading down the inside of the injection tubing of the disposal well until it encounters the formation fluid level standing inside of the tubing. The injection tubing is not totally fluid filled above the fluid level. The fluid level rises inside the tubing as injection occurs until a stable fluid level is reached for the rate of injection being used. The column of fluid inside the tubing provides the hydrostatic pressure or “pressure head” necessary to move the injection fluid

through the tubing and out into the disposal zone. This is known as gravity injection. The wellhead tubing vacuum reading on the gauge and recorder commonly observed and measured during gravity injection is the result of the injection fluid cascading down the tubing and any air above the static fluid level has been displaced from the tubing. There is actually some small amount of open space in the tubing above the fluid level. A vacuum is defined as an enclosed space from which air has been removed or partially removed so that the air remaining in the space exerts less pressure than the atmosphere. Thus, there is often a vacuum pressure reading on the injection tubing during injection.

db  
UICI-IP-2  
r/geology/procedures/  
10/2013

# ATTACHMENT I

## TYPICAL CLASS I WELL CONFIGURATION

