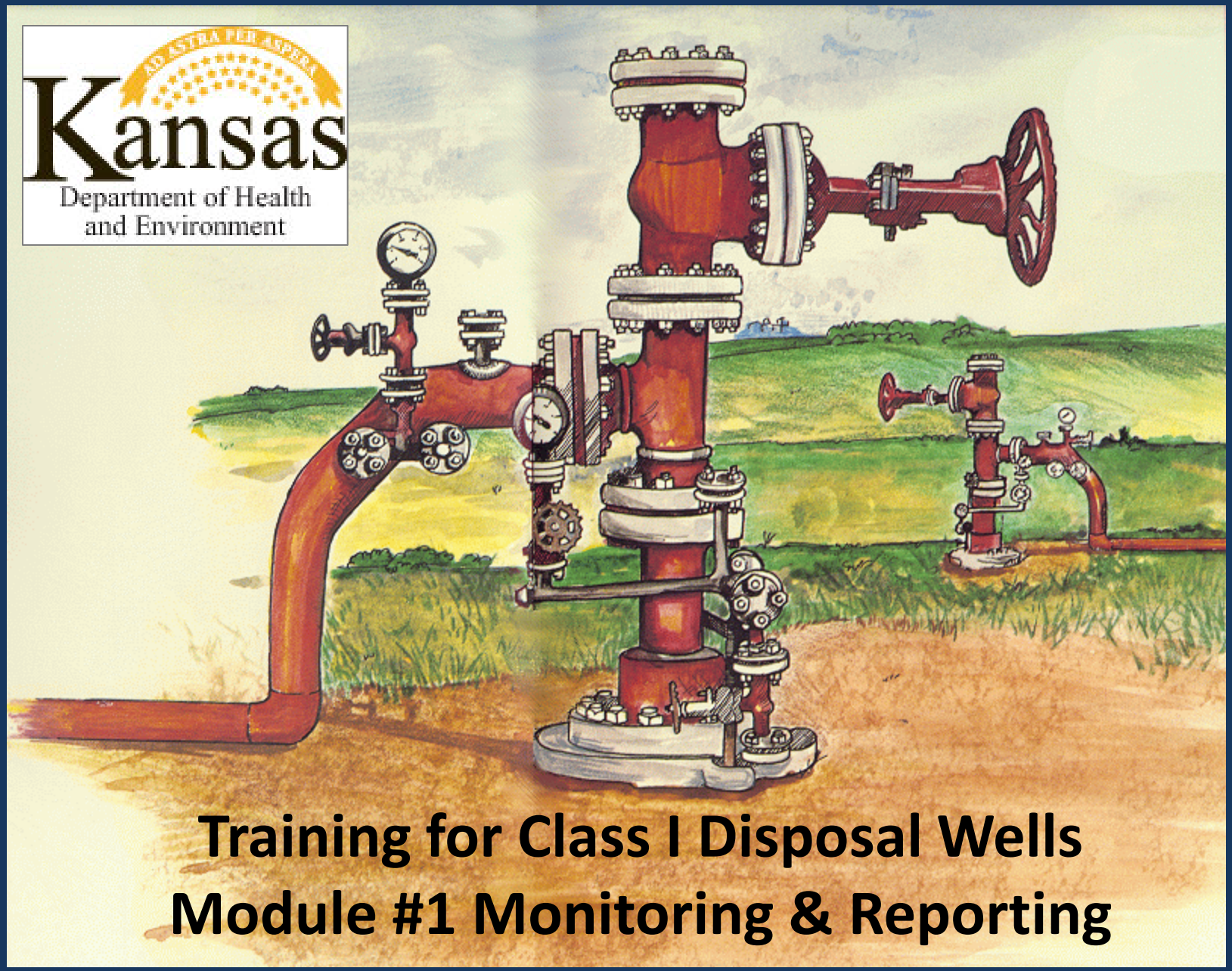

Kansas
Department of Health
and Environment
Training for Class I Disposal Wells
Module #1 Monitoring & Reporting

Disclaimer

- This outreach module is for informational and educational purposes only. It is not to be considered as a complete listing of requirements. The operator must review the applicable state and federal regulations and statutes and the facility UIC permit to determine the requirements. Nothing contained herein should be construed as legal advice by KDHE.

Purpose of KDHE's Environmental Programs

- The mission of the KDHE Division of Environment, which the UIC Program is located, is the protection of the public health and environment.

- The Division conducts regulatory programs involving public water supplies, industrial discharges, wastewater treatment systems, solid waste landfills, hazardous waste, air emissions, radioactive materials, asbestos removal, refined petroleum storage tanks, and other sources which impact the environment. In addition, the Division administers other programs to remediate contamination, lessen nonpoint pollution, and evaluate environmental conditions across the state.

Purpose of KDHE's Environmental Programs...cont.

- Occasionally operators violate permit requirements.
- Operators usually correct compliance problems quickly and effectively, however, there are some instances in which administrative orders and fines must be issued.

Purpose of KDHE's Environmental Programs…cont.

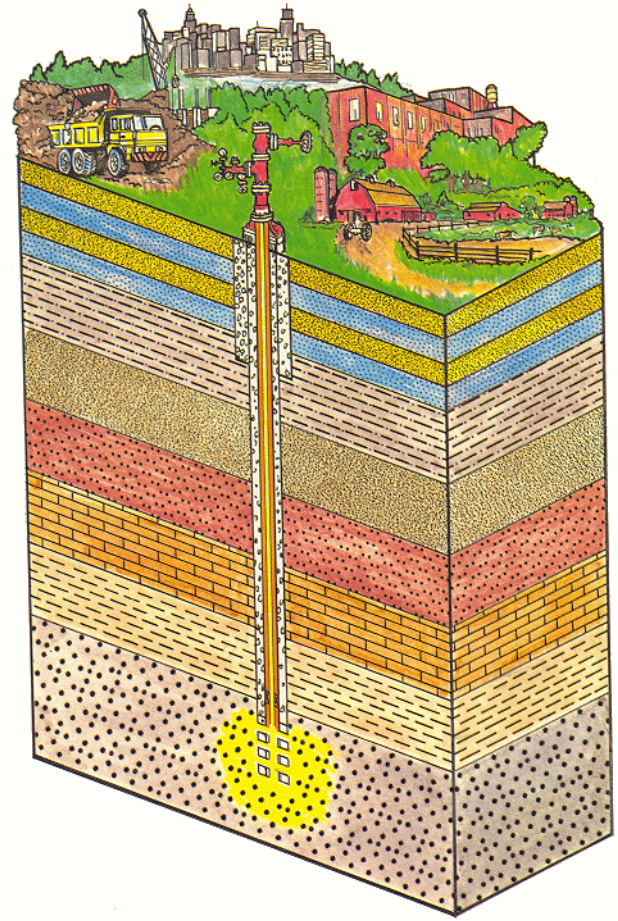
- The Division has statutory authority for control of most environmental contaminants and conditions related to human health, aquatic flora and fauna, plant and animal life, water and soil.

- Environmental Goals of the Division are to maintain a healthful environment free of disease-causing agents, reduce and prevent irritants affecting enjoyment of life and property, preserve natural resources and develop environmental control programs that are responsive to Kansas' needs in a cost-effective manner.

Purpose of KDHE's Environmental Programs…cont.

- These environmental goals, mission and legislative mandates are primarily regulatory in nature and are accomplished or met by implementation of a variety of regulatory programs, including the Underground Injection Control (UIC) Program.

UIC HISTORY



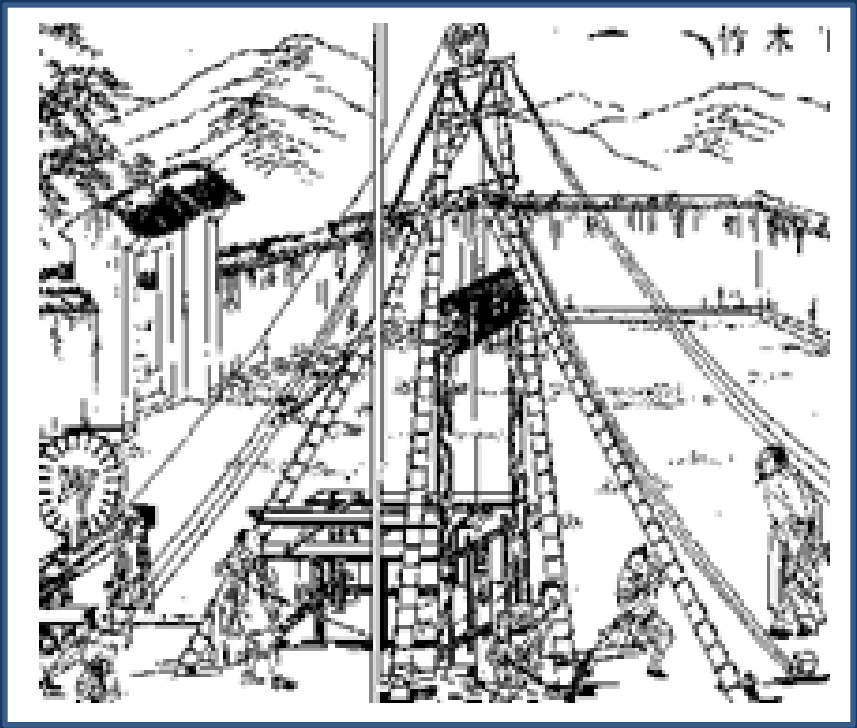
Underground Injection Control

- Since the 1930's oilfield brines have been injected into formations containing naturally occurring mineralized water.
- Kansas has regulated the injection of oilfield brine since the 1930's.
- Industrial wastes have been injected into deep disposal formations since the 1950's.
- Kansas has regulated the injection of industrial waste since the 1950's.

Several incidents nationwide involving pollution were traced to the use of injection wells. It was realized injection activities could contaminate groundwater if not conducted under strict controls. Congress developed the Federal Underground Injection Control program.

Regulatory History of UIC Wells

China – Drilling for Salt Circa 400 AD to Depths of 3000 Feet – First Injection Well



Chinese technology included drilling into a salt deposit, with at least two holes one to feed and flood fresh water into the salt formation, and the second hole to allow the water to ‘well’ up after dissolving the salt, into evaporation pans, where it could be again concentrated by evaporation. Evaporation would then occur either by solar, heat, or by manual boiling using convenient fuel for burning.

Regulatory History of UIC Wells

- Since the 1930s, oilfield brines have been injected into formations containing naturally occurring mineralized waters.
- Industrial waste injection started in 1950 with Dow Chemicals injecting industrial fluids into deep wells.
- In the 1960's, Dupont Chemicals also started injecting industrial wastes into deep wells.

Regulatory History....cont.

- In the early 1970s, wastes injected into an abandoned oil well by a paper mill in Hammermill, PA spilled out and contaminated the surrounding areas.
- This attracted the attention of the EPA and the State of Pennsylvania.

Regulatory History....cont'd

- The EPA tried using authorities provided by Public Law 92-500 (Clean Water Act) to establish regulations to control underground injection.
- In EXXON vs. EPA in 1973, the courts ruled that EPA did not have authority under the Clean Water Act to regulate underground injection.

Regulatory History....cont'd

- In order to provide EPA the authority to regulate injection wells, Congress, in passing the Safe Drinking Water Act (SDWA) in 1974, provided EPA the authority to control underground injection to protect underground drinking water sources (SDWA, Part C, Sections 1421-1426).
- EPA published final technical regulations for the UIC program in 1980, which included minimum standards state programs must meet to receive primacy for the Section 1422 UIC Program.

Regulatory History....cont'd

- Primacy – State UIC Programs have primary enforcement responsibility once their UIC Program has been approved by EPA.

- Direct Implementation – If a state does not obtain primacy for all or some classes of wells, EPA implements the program directly through one of its Regional Offices.

Regulatory History....cont'd

- In 1981, Congress passed amendments to the SDWA (Section 1425), which allowed the delegation of the UIC program for oil and gas related injection wells to states.
- Between 1981 and 1996, EPA granted primacy to 34 states for all injection wells (except those in Indian Lands).
- EPA implements the program directly in 10 states and shares responsibility in 6 states.

The UIC Program in Kansas

- The KDHE received primacy from EPA, Region 7 on December 2, 1983 to implement the Section 1422 UIC program.
- The major elements of the primacy document consist of State statutes and regulations, Statement of Legal Authority, Memorandum of Agreement and Program Description.

The UIC program in Kansas ....cont'd

- KDHE adopts, promulgates and implements Section 1422 UIC regulations and standards. The State can be more stringent, which KDHE is.
- EPA adopts by reference state statutes and regulations that contain standards, requirements, and procedures applicable to owners and operators.
- EPA provides program guidance and oversight.
- EPA retains authority to review petitions for exemption from land disposal regulations to allow injection of hazardous wastes in Class I wells.

UIC DEFINITIONS

- **INJECTION**

  The subsurface emplacement of fluids through a well.

- **INJECTION WELL**

  A bored, drilled or driven shaft whose depth is greater than the largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system.

- **SUBSURFACE FLUID DISTRIBUTION SYSTEM**

  An assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground. This includes a leachfield system.

- **FLUID**

  Any material that flows or moves whether it is semi-solid, liquid, sludge or gas.

Federal UIC Program

- The EPA administers the Federal UIC program.
- Title 40 in the Code of Federal Regulations implements the program.
- The regulations came about under the authority of the Safe Drinking Water Act in 1974.

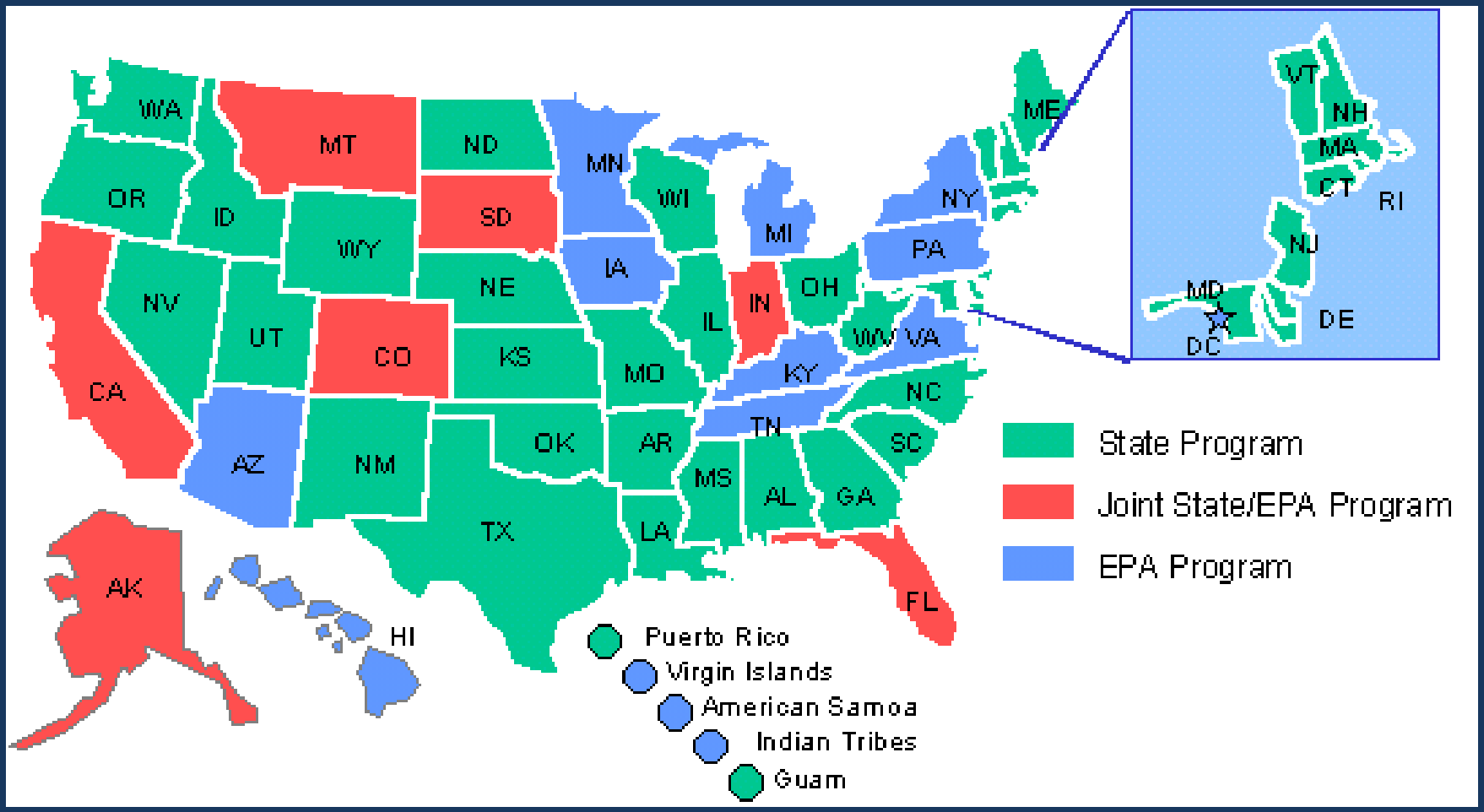
KDHE EPA Relationship

KDHE IMPLEMENTS THE UIC PROGRAM IN KANSAS FOR EPA

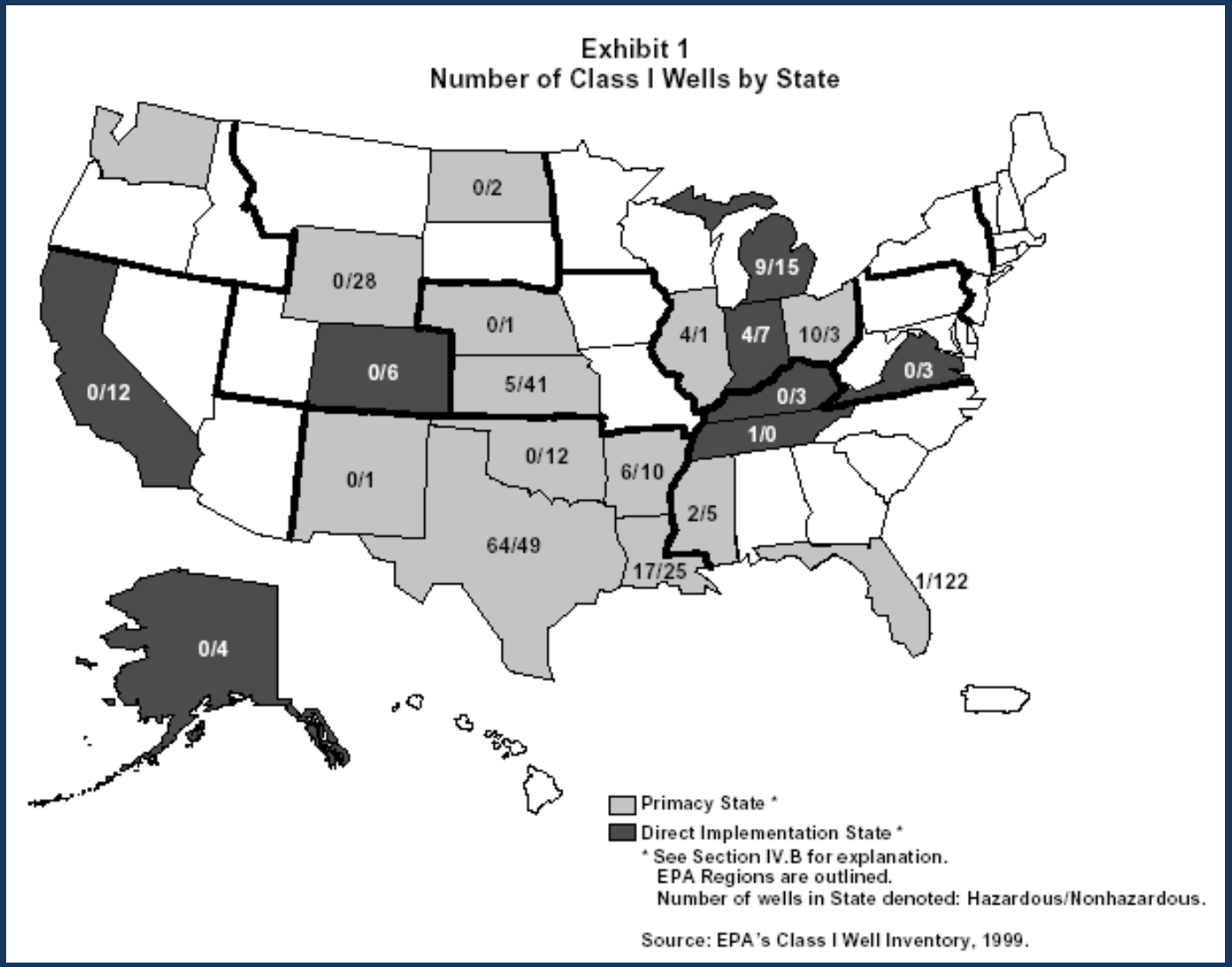
KDHE - Has Primacy over the UIC Program for Class I, III, IV and V wells. This means KDHE administers in Kansas the program for EPA.

Other states have Direct Implementation. That means the EPA administers the program for that state.

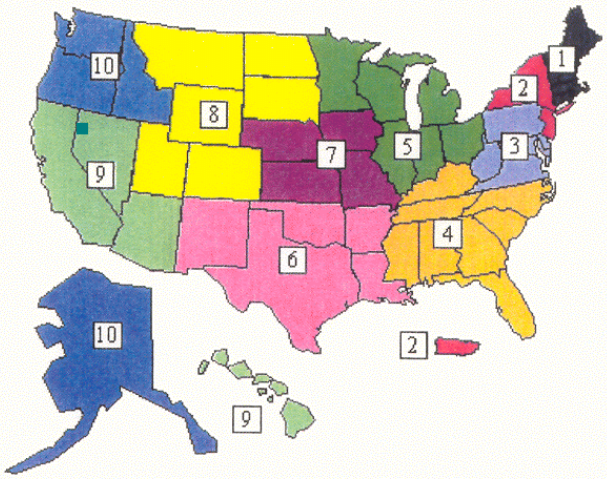
State UIC Programs



UIC Wells by State



EPA Regions



Region 1 - responsible within the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Region 2 - responsible within the states of New Jersey, New York, Puerto Rico and the U.S. Virgin Islands.

Region 3 - responsible within the states of Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia.

Region 4 - responsible within the states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee .

Region 5 - responsible within the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin .

Region 6 - responsible within the states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

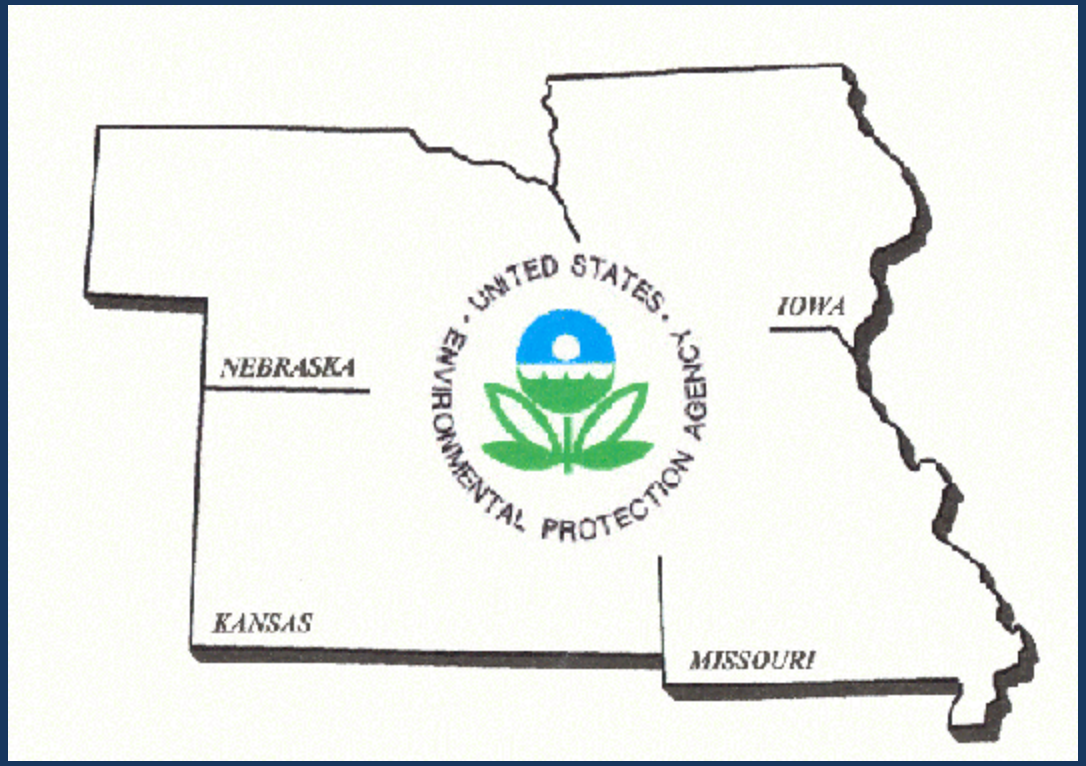
Region 7 - responsible within the states of Iowa, Kansas, Missouri, and Nebraska.

Region 8 - responsible within the states of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

Region 9 - responsible within the states of Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

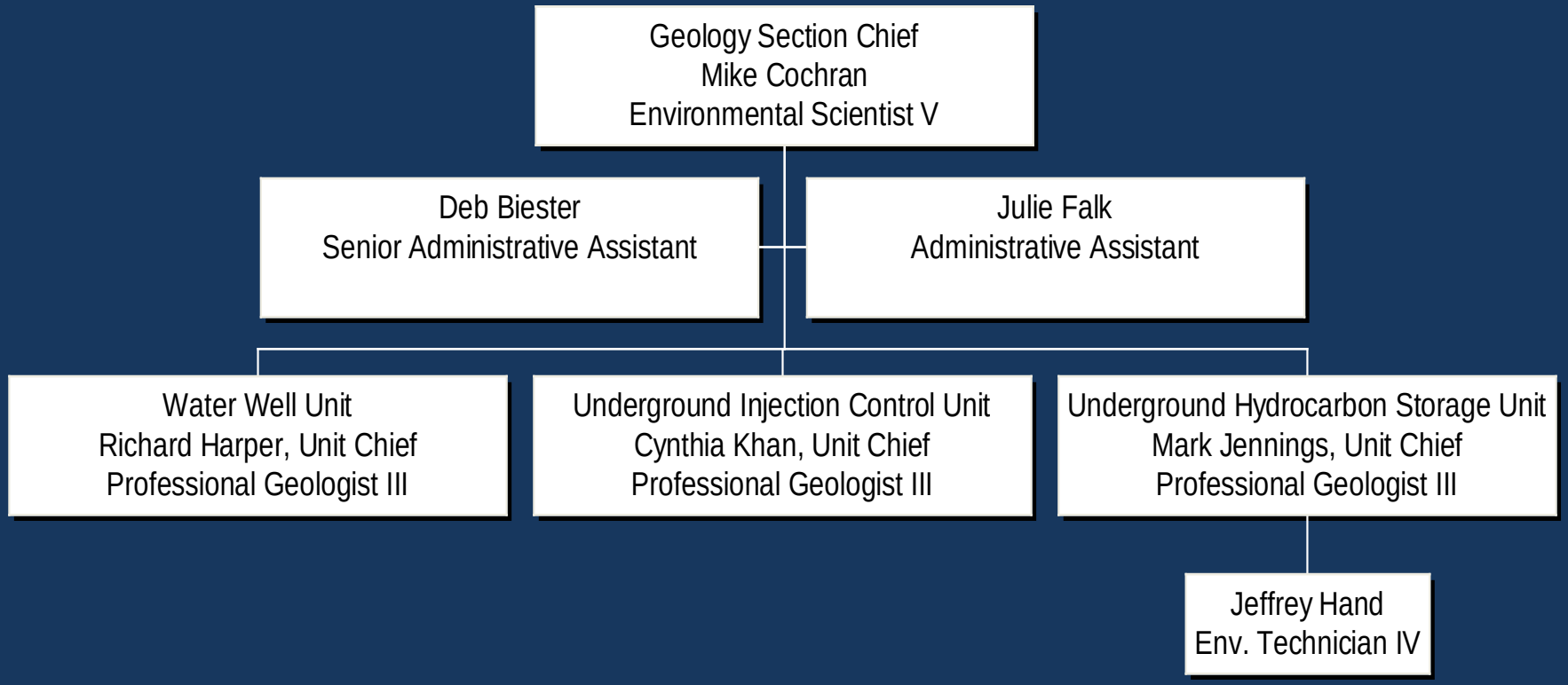
Region 10 - responsible within the states of Alaska, Idaho, Oregon, and Washington.

REGION 7 ORGANIZATION CHARTS



U.S. ENVIRONMENTAL PROTECTION AGENCY
901 N. 5TH STREET
KANSAS CITY, KS 66101

Geology Section
Bureau of Water



Purpose of the UIC Program

Function of the UIC program is to ensure the injection of fluids is done in a controlled manner that will:

- Protect the soils and waters of the state from contamination.
- Protect public health.
- Conserve the water resources of the state.

How do we dispose of waste?

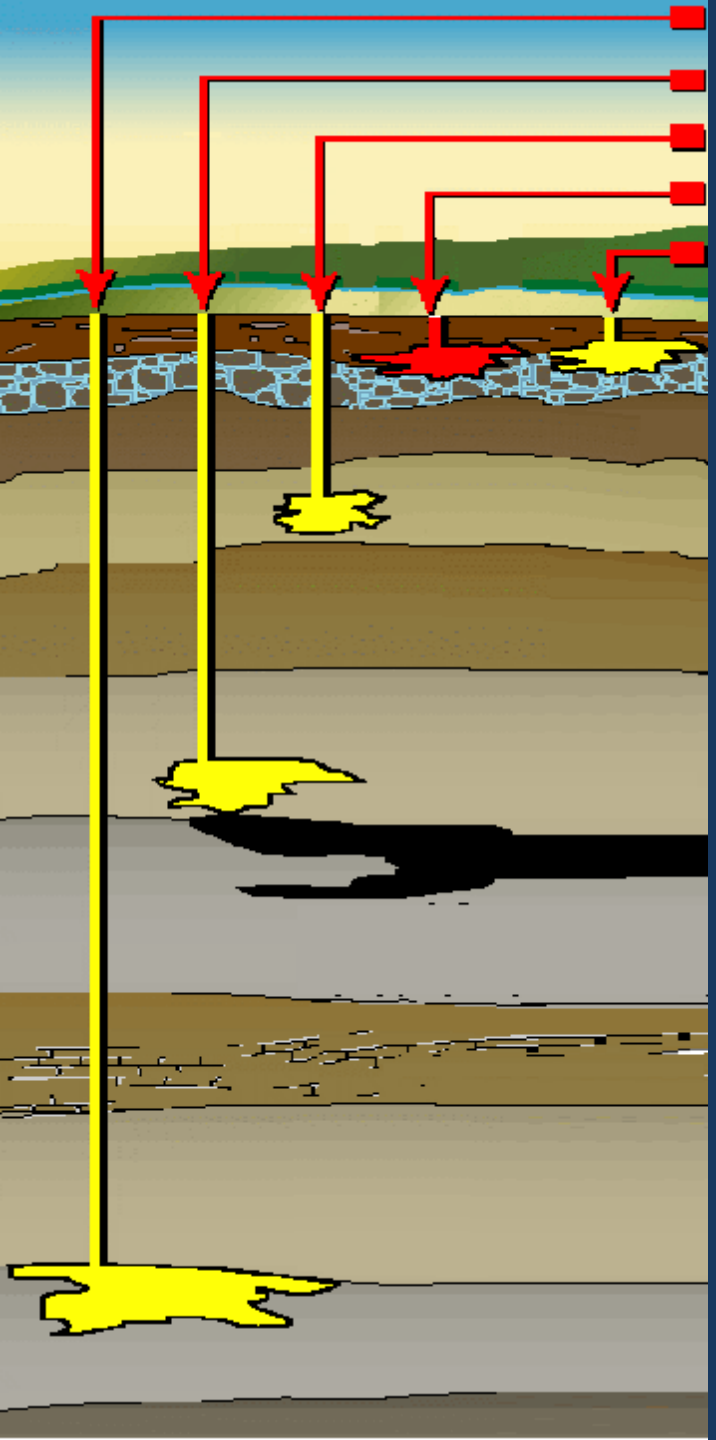
- The generation of waste is an unavoidable result of the manufacturing and industrial processes which produce thousands of the products we use every day.
- Industry continues to reduce waste by recycling and waste minimization activities, but there are still many wastes which require disposal.
- There are many environmentally sound disposal methods including incineration; biological or chemical treatments; properly located and constructed landfills; and for certain wastes, disposal through injection wells.
- KDHE has a policy for determining which wastes are eligible for disposal into class I injection wells.

Wastes Eligible for Disposal

- Wastes that cannot feasibly be treated, stored or disposed by other methods.
- For new injection proposals a report must be submitted detailing the results of studies of alternate methods of:
- waste treatment,
- storage or disposal technologies
- including an economic analysis based on a 30 year time period, justifying why subsurface disposal is considered the most feasible method of disposal.

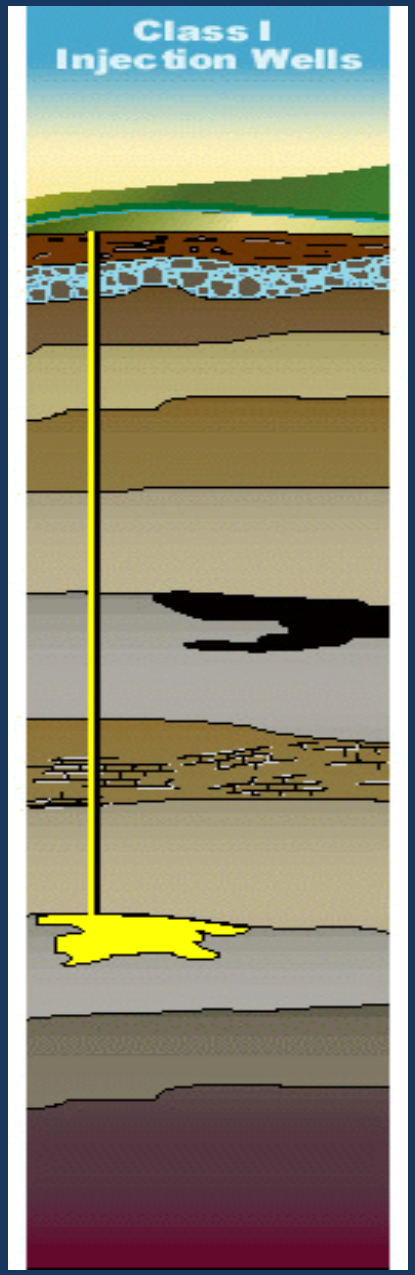
Wastes Eligible for Disposal – Cont.

- Once applicant receives a permit, they are expected to develop, periodically update, and implement an ongoing waste minimization program addressing the wastes being directed to the Class I UIC disposal well.



There are Six Injection Well Classifications

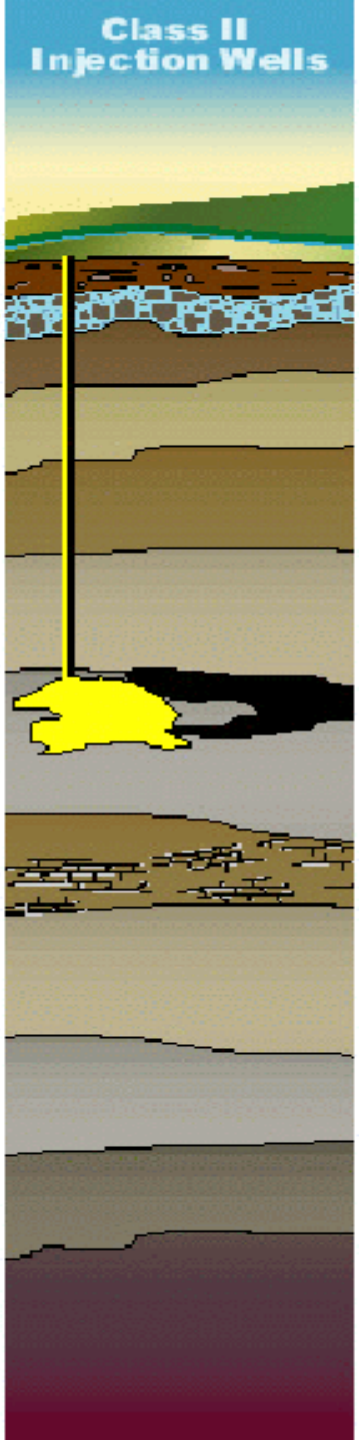
- There are regulations specific to each class of well.



CLASS I INJECTION WELLS

(Regulated by KDHE)

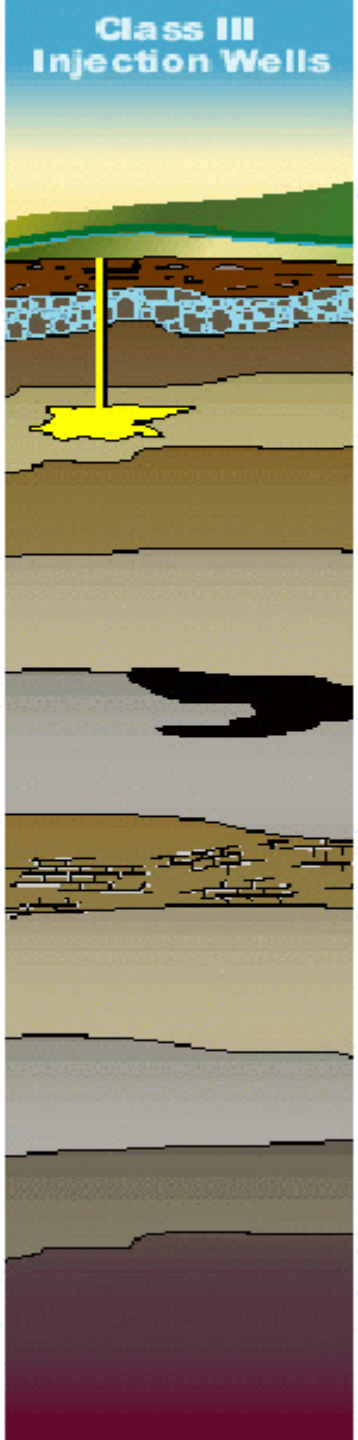
These wells inject hazardous waste as defined under the Resource Conservation Recovery Act (RCRA) and non-hazardous wastes into deep rock formations that are separated vertically from the lowermost source of fresh or usable water by many layers of impermeable shales and limestones.



CLASS II INJECTION WELLS

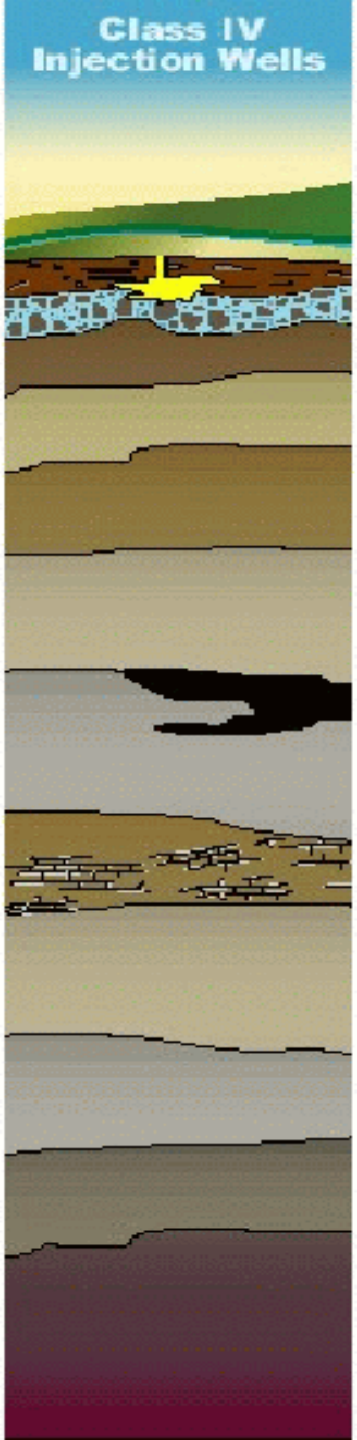
(Regulated by KDHE)

These wells are used for injection of fluids brought to the surface in connection with oil and natural gas production. The Kansas Corporation Commission regulates Class II wells.



CLASS III INJECTION WELLS
(Regulated by KDHE)

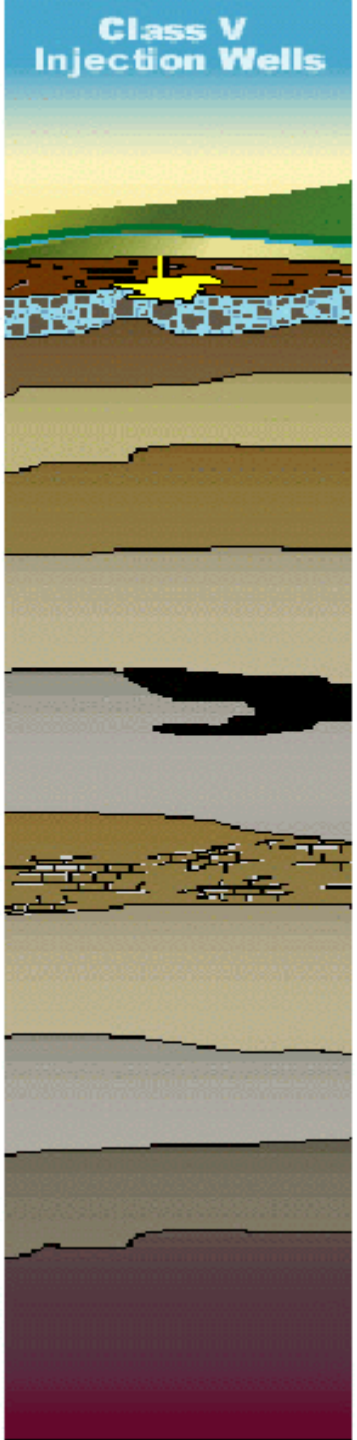
- Class III wells inject steam or water into mineral formations, which dissolves or loosens minerals, which are then pumped to the surface and extracted. More than 50 percent of the salt and 80 percent of the uranium extracted in the U.S. are produced this way.
- In Kansas the only mineral mined in this manner is salt.



Class IV Injection Wells

Regulated by KDHE

These wells inject hazardous waste as defined under RCRA or radioactive wastes into or above the fresh or usable water zone. These wells are prohibited because they directly endanger the environment and human health.



CLASS V INJECTION WELLS

(Regulated by KDHE)

- These injection wells are not included in Class I, II, III, IV or VI. Typically Class V wells are **shallow** wells used to place a variety of nonhazardous fluids, that is those wastes which are not hazardous waste under RCRA, directly below the land surface. The fluid injected into certain types of Class V wells is non-hazardous, but can in some cases contain contaminants.

CLASS VI INJECTION WELLS

(Regulated by U.S. EPA)

A new class of injection well:

Class VI wells are used for injection of carbon dioxide for geologic sequestration (geosequestration).

Where do I look for the monitoring requirements?

- 40 CFR 146.13 lists the “Operating, Monitoring and Reporting Requirements” for the federal program.
- K.A.R. 28-46-30 which references 40 CFR 146.13 establishes the “Operating, Monitoring and Reporting Requirements” for the KDHE program.
- K.A.R. 28-46-9 Establishes Permit Conditions and references 40 CFR 144.52 This allows KDHE to establish additional monitoring requirements in the permit.
- 40 CFR 144.52 states “ the Director shall establish conditions, as required on a case-by-case basis.”
- What does this mean?

Your Permit Tells You.....

- What you are authorized to inject.
- How often monitoring reports are to be submitted to KDHE (no later than 28 days after the end of the month being reported).
- Injection and operational parameters and limits. (Example -Maximum Daily Injection Volumes)
- Data that must be reported.

The federal and state regulations establish the monitoring requirements and these regulations also allow KDHE to establish additional requirements to address a specific situation.

- To sum it up: Your Class I Permit will have all of the necessary information you need to know about monitoring requirements, but you still must be familiar with the Federal and State Regulations.

- You must follow your permit requirements to be in compliance.

- The permit needs to be readily available for reference purposes to those responsible for operation of the well.

What can happen if you violate your permit?

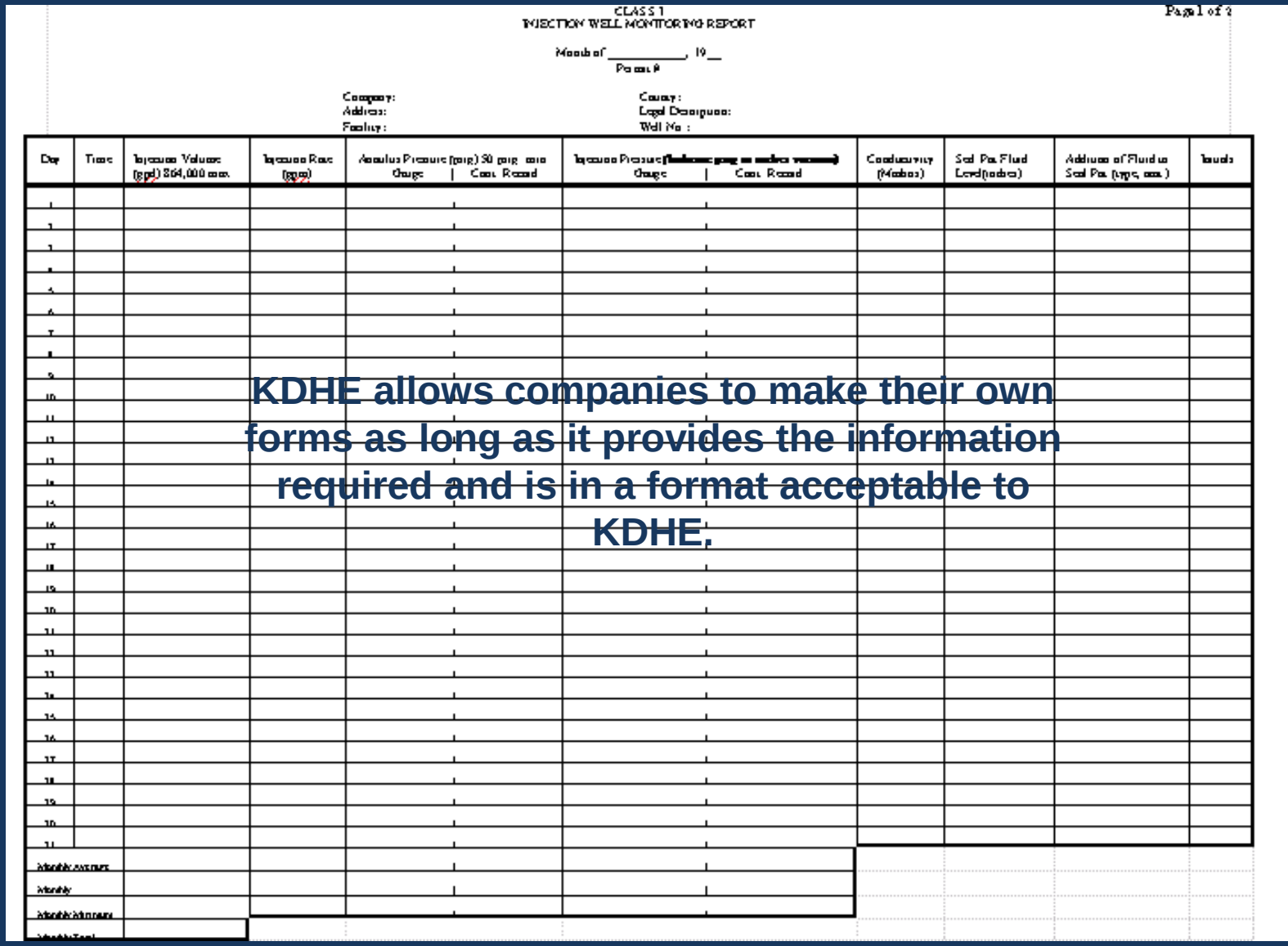
- The company may receive a notice of violation, a directive order or an administrative order.
- Revocation of permit.
- The company may be issued an administrative penalty order of up to $10,000 a day for each day the company is in violation. Penalty provisions are authorized by KSA 65-170d.
- You will make us very upset.

What to send in to KDHE?

No later than 28 days after the end of the month.

- The monitoring report form properly completed.
- Report explaining any anomalies or violations and description of corrective action implemented.
- Explanation for any monitoring data not obtained and corrective action implemented.

All monitoring data required for reports shall be submitted on forms prescribed by KDHE.



CLASS I
INJECTION WELL MONITORING REPORT

Page 1 of 2

Month of _____, 19__
Permit #

Company:
Address:
Facility:

County:
Legal Description:
Well No :

Day	Time	Injection Volume (gpd) 364,000 max.	Injection Rate (gpm)	Annulus Pressure (psig) 50 psig min Gauge | Cont. Record	Injection Pressure (Indicate gauge or surface measure) Gauge | Cont. Record	Conductivity (Mohos)	Sat. Pit. Fluid Level (inches)	Addition of Fluid to Sat. Pit. (type, amt.)	Initials
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
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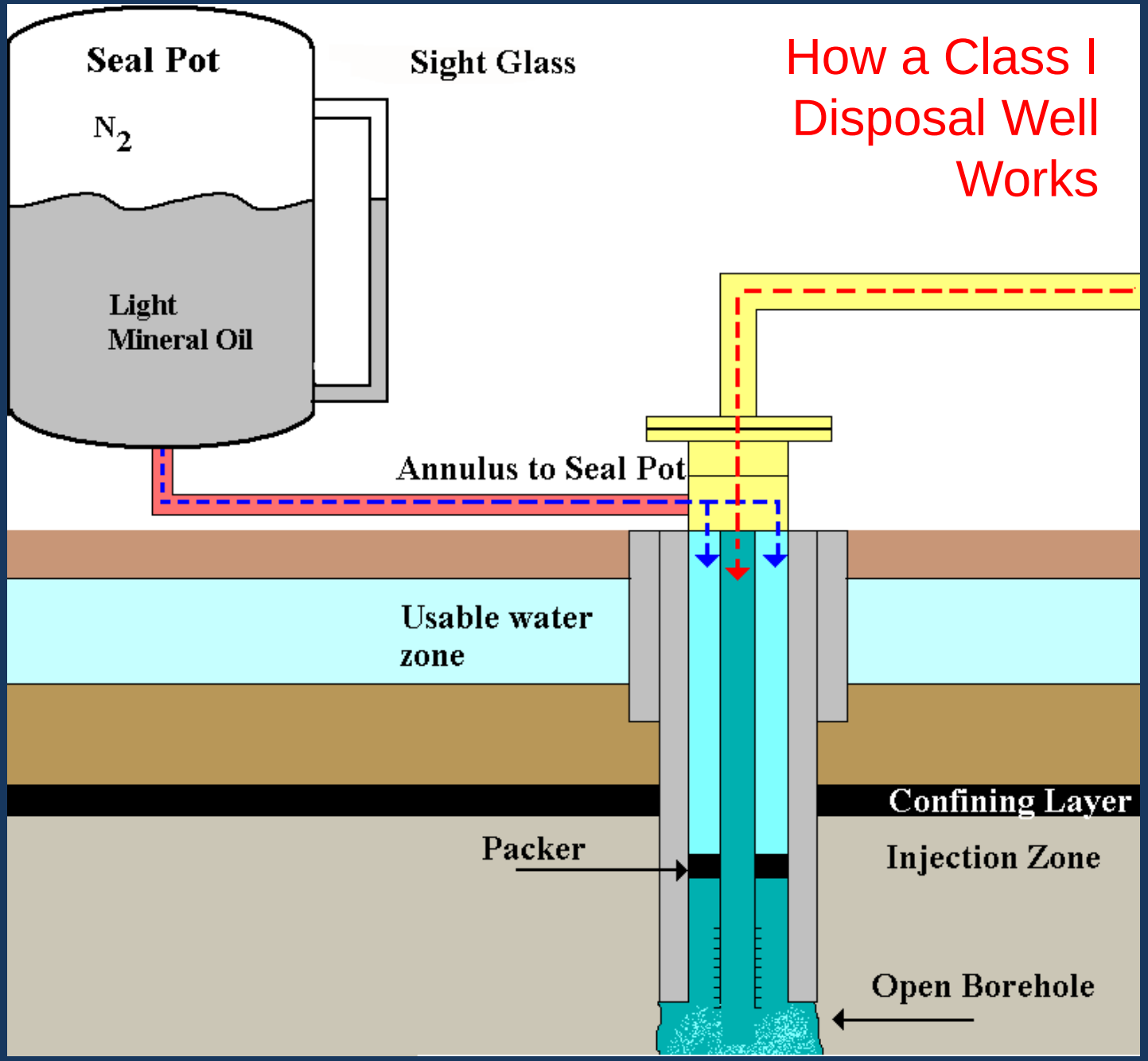
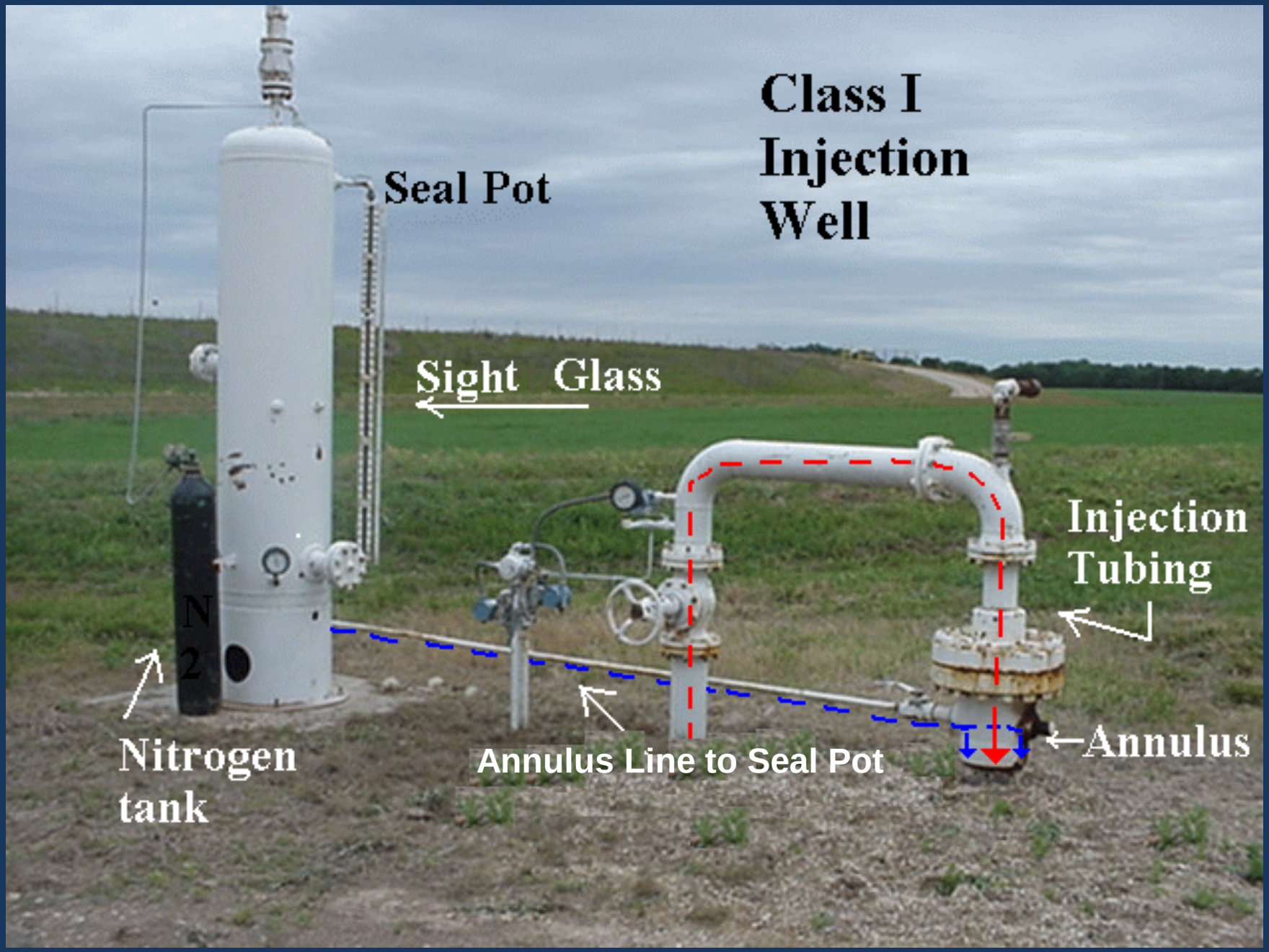
25									
26									
27									
28									
29									
30									
31									
Monthly average									
Monthly									
Monthly Minimum									
Monthly Total									

KDHE allows companies to make their own forms as long as it provides the information required and is in a format acceptable to KDHE.

How a Class I Disposal Well Works



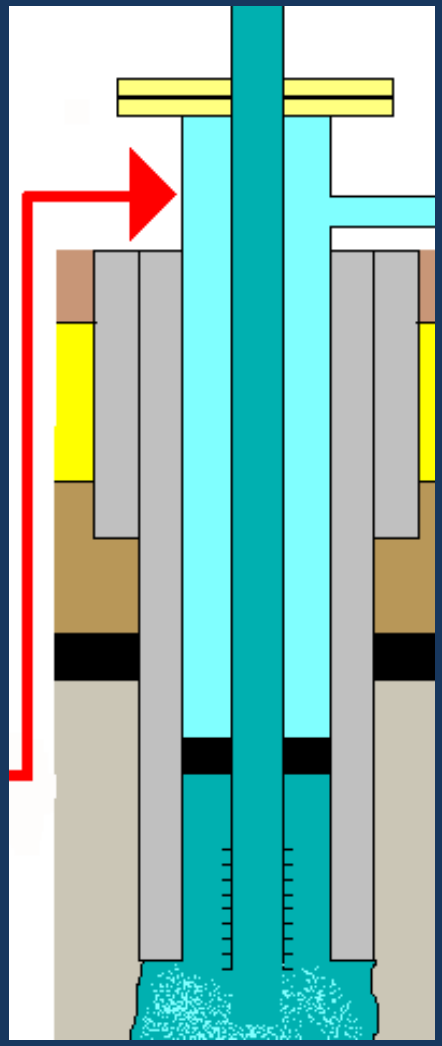

Class I
Injection
Well
Seal Pot
Sight Glass
Injection
Tubing
N
2
Nitrogen
tank
Annulus Line to Seal Pot
Annulus

Seal Pot Expansion/Contraction

- Allows for expansion of annular fluid to prevent damage to well components.
- Maintains pressure on annular monitoring system.
- Allows us to monitor the annulus liquid level.

Operating Annulus Pressure and Annulus Liquid Level

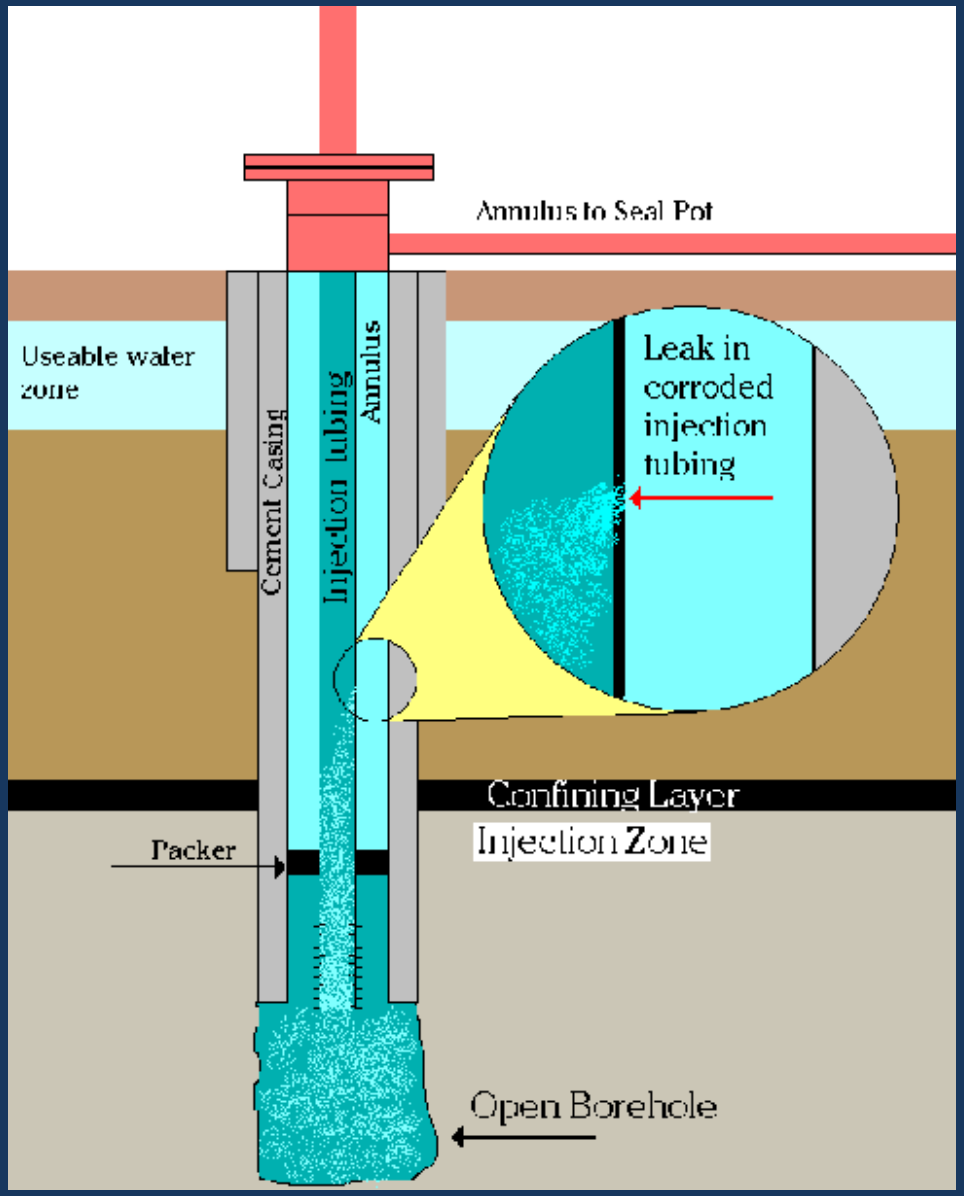
- Purpose:
  - To provide early detection of a leak
  - To prevent the contamination if a leak should develop
  - Indicates a leak in the injection tubing, packer or casing.
- Continuous monitoring of the annulus pressure and annulus liquid level can reveal a mechanical integrity problem relatively soon after it occurs.
  - Principle of the annulus monitoring system: The annulus functions like a sealed jar. If there are no leaks in the system, the annulus pressure and liquid both remain within a constant range of values.
- A down-hole problem will be indicated by a loss in annulus pressure and/or loss of annulus liquid.



Three Types of Leaks Annulus Pressure or Annulus Liquid Level Losses Can Detect

- Leak in the tubing
- Leak in the Casing
- Leak in the Packer

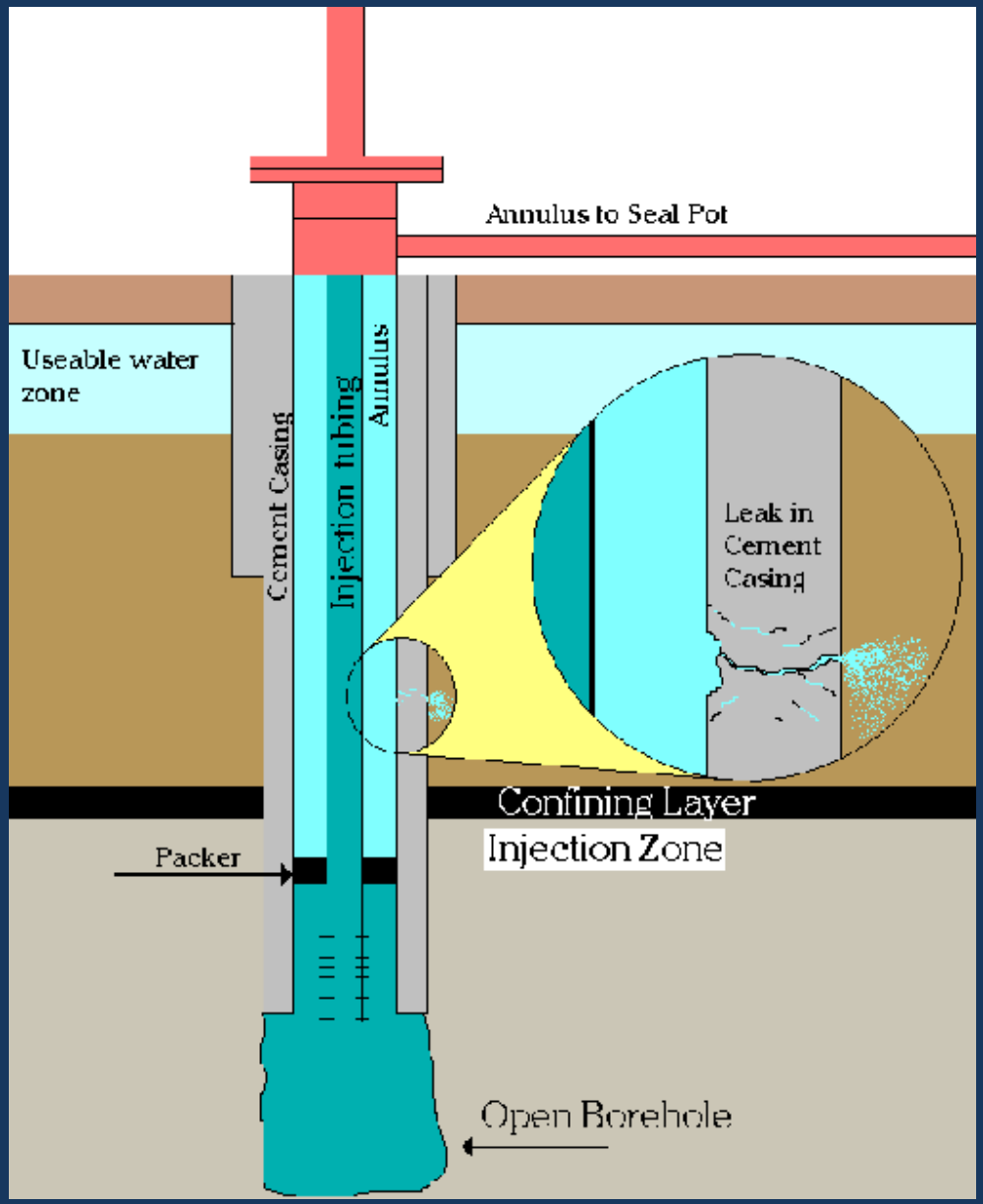
1) Through the tubing



Years of use can cause the injection tubing to corrode.

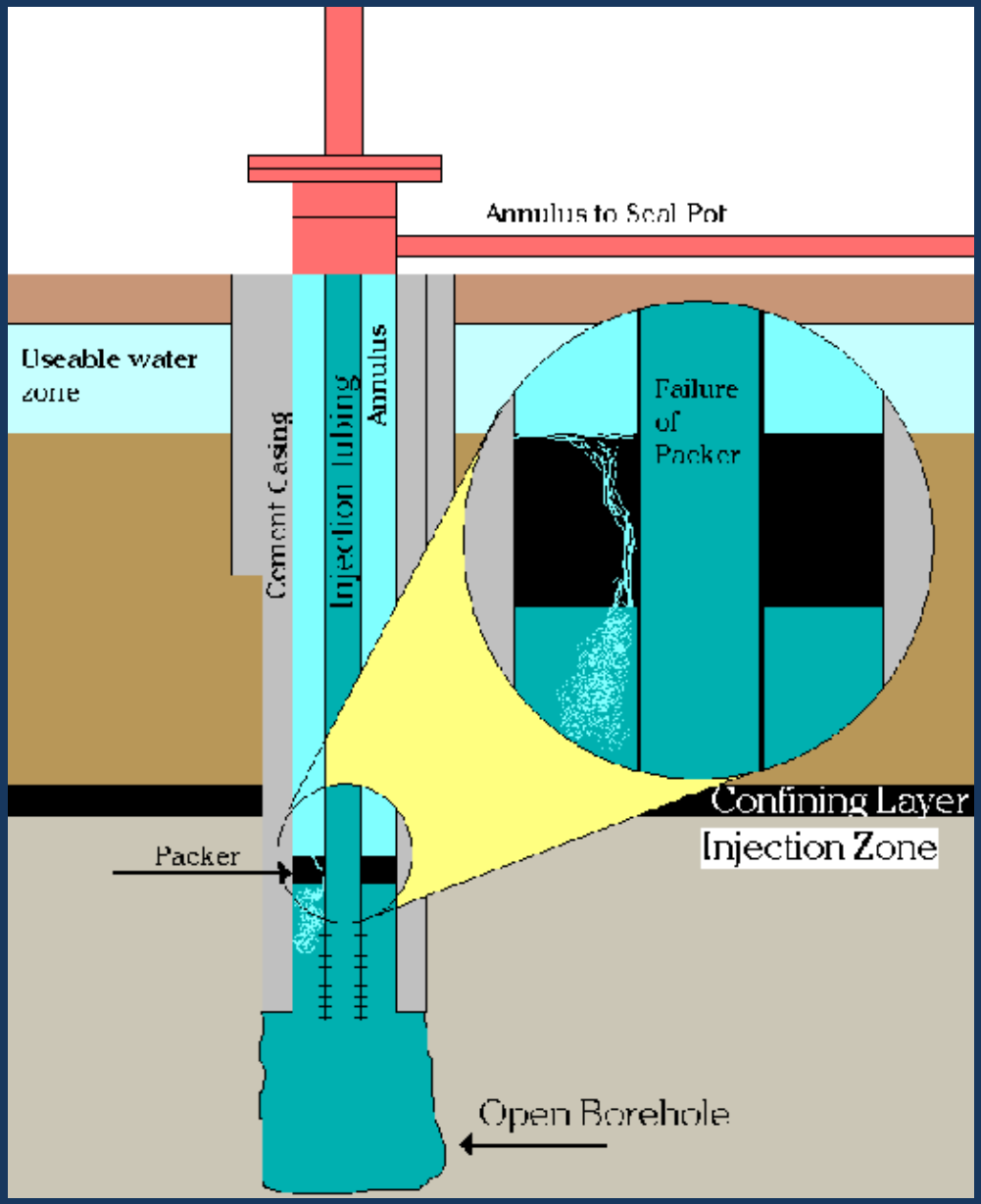
Corrosion of the tubing can be caused by low pH waste, or oxygen in the presence of other constituants. Suspended solids can also cause abrasion in the tubing.

2) Through the Casing



Defects in cementing can allow corrosive formation fluids to corrode the casing.

3) Through the Packer



Deterioration of the rubber sealing elements can cause the packer to leak.

Metal components in the packer can be corroded.

Reporting Annulus Pressure

Annulus pressure inspection readings must be recorded daily.

- Annulus pressure must be monitored by both a gauge and an electronic continuous recording device.
- Gauge readings and continuous recorder must correspond to each other.
- Annulus pressure must be maintained above the minimum pressure as described in the permit.
- Failure to maintain this minimum pressure is a violation of your permit, which can lead to.....

- The company may receive a notice of violation, a directive order or an administrative order.
- Revocation of permit
- A fine of up to $10, 000 a day for each day the company is in violation.

Injection Volume

Injection must be recorded daily.

- Injection volume must be monitored by use of an appropriate type of flow meter.
- QUESTION: How much waste can be injected into the Class I well?
  - The permit states the maximum volume that can be injected for a single day.
- QUESTION: WHY must there be a limit?
  - It encourages waste minimization
  - Too large a volume could increase the extent of the cone of influence allowing movement through conduits.
  - must be a practical volume for gravity fed wells.
- Injecting more than the maximum volume is a permit violation.

Injection Pressure

Injection pressure inspection readings must be recorded daily.

- Injection pressure must be monitored by both a gauge and an electronic continuous recording device.
- Injection Pressure for a Kansas Class I well is limited to gravity flow.
- Injection pressure is limited to reduce stress to the wells components.
- Limits injection pressure in the formation.
- Limits severity of impact should a release occur.
- Gauge readings and continuous recorder must correspond to each other.
- Specify what the units are: Vacuum or PSIG.

Seal Pot

Reporting Requirements

- The liquid level must be monitored by use of a sight glass with a scale in inches.
- Must report liquid level inspection readings daily.
- Addition of liquid must be reported in gallons, not inches.
- Report the volume of any liquid added to the seal pot.
- Why?
  - The seal pot monitors for significant leaks in the well. This allows us to see rate of liquid loss in the annulus.

Injection Rate

Injection rate must be recorded daily.

- This is a parameter that is required to be monitored, but is not a significant concern because of the injection pressure limitations.
- Provides information on the performance of the well and injection capacity.

Injection Liquid Sample Analyses

- Sampling analysis are broken up by industry types.
  - Example: a beef packing company will have different constituents going down the well than a fractionation facility

- Why are samples analyzed?
  - To characterize the waste and determine if hazardous or nonhazardous.
  - Public, operators and regulators need to know what's going into the ground.
  - To detect characteristics that could damage the well components and/or disposal zone requiring a need for corrective action to be taken.

- For example, why test for pH?
  - If the pH is too low the waste is considered a hazardous waste.
  - Low pH can damage well components.

Sample Analysis

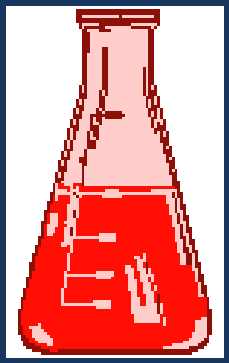
- Why must a sample be analyzed before holding time is exceeded?
  - If the sample is allowed to sit for too long it begins to deteriorate and will not be a representative sample of the injection waste.
- Remember to include the name of the certified lab and the labs certification number.
- The lab must be certified by KDHE to analyze for the constituents of concern. This ensures quality assurance for the sample analysis.

Sampling

- Weekly sampling should be done every 7 days.
  - To obtain an accurate representation of what is being injected, try to keep from sampling back to back.

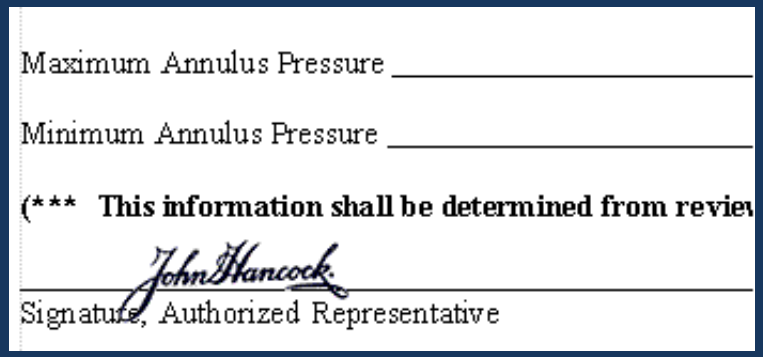
November 2000

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday - Sunday
30	31	1 SAMPLE	2	3	4 5
6	7	8 SAMPLE	9	10	11 12
13	14	15 SAMPLE	16	17	18 19
20	21	22 SAMPLE	23	24	25 26
27	28	29 SAMPLE	30	1	2 3



Signature

- The monitoring report form must be signed by someone who has signatory authorization. K.A.R. 28-46-22 establishes the signatory requirements.
- A responsible corporate officer such as: president, vice president, treasurer, secretary of the corporation in charge of a principal business function or any other person who performs similar policy or decision making functions for the corporation, must sign the form.
- Signatory authorization can be appointed by a responsible corporate officer:
- A Plant Manager if that company has 250 people employed or gross annual sales or expenditures exceeding $25 million in 1985 dollars.
  - Or by a duly authorized representative of the above describe plant manager. (must be presented in writing)
- WHY?
  - To have someone of responsibility to attest to the correctness of the report.



Initialing Report

- Documenting purposes.
- Indicates who was taking the readings.
- Indicates who to question should a problem arise.
- Verifies inspection readings were conducted.

Problems we encounter with Monitoring Reports

Mr. So and So
Company Industries, Inc.
P.O. Box 1234
Anywhere, KS 66203

You don't want to get these letters.

We don't want to send them.

Re: Class I Monitoring Report
Company Facility

Dear Mr. So:

We reviewed the monthly monitoring report for June 2012 and have a question. Blah Blah Blah Blah Blah.

A response is needed on or before August 15, 2012.

If you have any questions, I can be contacted at 785-296-5554 or e-mail address ckhan@kdheks.gov.

Problems we encounter with Monitoring Reports

- The name of the company is incorrect.
- The units are incorrect or not specified.
- Samples are not analyzed within the their specific holding times.
- Annulus pressure below minimum permitted value.
- First page of the report was missing.
- Maximum injection volume is exceeded.
- Fluid volume added to seal pot written in inches and not in gallons.
- Weekly samples not taken.
- Quarterly samples not taken.
- Gauges and continuous recorders do not correspond with each other.
- Data not reported.
- Data left on spreadsheet from previous reports.
- Incorrect monthly average injection rate.
- Reports turned in late.