



**DRINKING WATER TREATMENT RESIDUAL
CLASS V INJECTION WELL
PERMIT APPLICATION**

Submit to:
Kansas Department of Health
and Environment
Bureau of Water, Geology Section
1000 SW Jackson St., Suite 420
Topeka, KS 66612-1367

Date of Application: _____

KDHE UIC Permit #: _____

Well(s) #: _____

Owner's Name, Telephone Number,
Mailing and E-mail Addresses:

G.P.S. Coordinates:
Latitude: _____
Longitude: _____

County: _____

Operator's Name, Telephone Number,
Mailing and E-mail Addresses:

Located on Indian Lands:
Yes _____ No _____

Facility Names, Telephone Number,
Mailing and E-mail Addresses:

Contact Person's Name and Mailing
Address:

Contact Person's Information:
Phone: _____
Fax: _____
E-mail: _____

In conformity with the provisions of K.S.A. 65-171d, the undersigned, representing

(Name of company, corporation, partnership, or person, or government
or other public agency applying)

hereby makes application to KDHE for a permit to dispose of liquid wastes into the subsurface by means
of a disposal well.

The application should address the following items in numerical order.

1. Provide documentation all required local approvals have been obtained.

2. Describe all treatment residuals to be disposed of, including physical, chemical, bacteriological and radiological properties and toxicity. Provide analyses for each waste stream including analyses for all constituents listed in Attachment A. Include Material Safety Data Sheets (MSDS) for any additives used. All analyses shall be conducted by a laboratory certified by the State of Kansas. Additional testing of the waste stream may be required after review of the application and pertinent information.
3. Provide a demonstration that each individual waste stream is not hazardous as defined by RCRA. This includes documentation that the waste is not a listed hazardous waste or a characteristic hazardous waste. The applicant makes the demonstration by evaluating the waste against a list of exempted wastes, the four lists of hazardous wastes (F, K, P, & U Lists) and the four characteristics of:
 - ignitability
 - corrosivity
 - reactivity
 - toxicity

KDHE's Bureau of Waste Management can be contacted at (785) 296-1600 for assistance.

Describe the procedures and methods used to obtain representative samples of the waste stream(s). Include a description of the following:

- location where the samples were collected
 - the method used to collect the samples
 - sample containers
 - sample storage
 - transportation of samples
 - chain of custody
 - quality assurance/control procedures used
4. Describe the sources, including individual processes, generating the various treatment residuals that are proposed to be injected. Provide a waste flow block diagram depicting the relationship of the sources to the proposed disposal well. Include all waste sources and estimated quantities of waste produced by each source. An example of an acceptable diagram format is attached.
 5. Provide a waste handling contingency plan for coping with well failure or shut-in of the well. Include a detailed description of any facilities used for this purpose.
 6. Provide the following using **Procedure UICV-12, Procedure for Completing Section #6 of the Permit Application for a Class V Injection Well** which can be found at:

<http://www.kdheks.gov/uic/download/UICV-12.pdf>

- a. Provide discussion and supportive information demonstrating drilling the disposal well and injecting treatment residuals into the subsurface stratum will not endanger

or injure any mineral resource (coal, oil, gas, salt, sand, gravel, others) bearing formations.

- b. A map indicating the boundaries and ownerships of tracts of land adjacent to the applicant's facility boundaries. Include a list of the names and mailing addresses of all owners of tracts of land adjacent to the plant boundaries keyed to the map.
- c. A USGS topographic map indicating the facility boundaries and well location. Include on this map an outline of the 0.25 mile radius area of review.
- d. Provide a clear, readable detailed map with an appropriate scale. The 0.25 mile radius area of review must be drawn on the map. The following, if present within the area of review, must be shown on the map.
 - the injection well to be permitted
 - oil and gas producing wells
 - inactive wells
 - injection wells
 - abandoned wells
 - dry holes
 - plugged wells
 - core holes
 - surface water bodies
 - springs
 - mines
 - quarries
 - water wells
 - monitoring wells
 - faults
 - other pertinent surface features

Provide a tabulation of data for all wells penetrating the injection zone within the area of review including the following:

- current status
- type
- construction
- date of drilling
- location
- depth
- plugging or completion data

Key these wells to the map. Copies of plugging records for wells penetrating the injection zones shall be provided if available. **A schematic indicating the current configuration of all wells penetrating the injection zone shall be submitted on the attached form.** Provide proposed corrective measures required for wells in the area of review, if any.

e. Describe the protocol used to identify, locate and ascertain the condition of all wells penetrating the injection zone within the area of review. At a minimum the records of the following shall be reviewed:

- Kansas Department of Health and Environment
- Kansas Geological Survey
- Kansas Corporation Commission

Provide documentation these sources were checked.

f. Provide surface geologic maps, cross sections, and structural contour maps illustrating the regional geologic setting.

g. Provide maps and cross-sections indicating the general vertical and lateral limits of all aquifers containing less than 10,000 mg/l total dissolved solids within the area of review, their position relative to the zone of injection and the direction of water movement if known. (i.e. groundwater flow map) All maps should include the area of review.

h. Provide detailed discussion of the nature and aerial development of upper and lower confining strata (lithology, permeability, etc.).

i. Provide descriptions, aerial extent, and maps of faulting and fracturing or lineations in the area and discussion of the seismic history and activity of the area.

j. Provide the following maps for the area using available well control:

- Structural contour map of the injection zone
- Isopach map of the injection zone
- Structural contour map of the confining zone
- Isopach map of confining zone

k. Provide a piezometric surface map of the injection zone or, if insufficient data is available, provide the expected static fluid level and regional gradient. Reference sources of this information and include the area of review on the map. Provide a description of porosity, permeability, and temperature of the injection interval and chemical characteristics of the injection interval fluid. Reference sources of this information.

l. Calculate the predicted injection zone pressure build-up within a one (1) mile radius of the proposed injection wellbore. Provide a pressure contour map for the area of review. Include calculations, equations, parameters and sources of information used to arrive at the predicted pressure build-up. This should be calculated for the expected life of the injection well. The effects of other wells injection into the same injection zone within the vicinity of the proposed well shall also be considered.

- m. Calculate the cone of influence. Provide a map showing the cone of influence. The cone of influence is defined as that area around the well within which increased injection zone pressures caused by injection into the injection well would be sufficient to drive fluids into a source of fresh and usable water. Include calculations, equations, parameters, and sources of information used to determine the cone of influence. This should be calculated for the expected life of the well.
7. Provide a report discussing the anticipated compatibility of the waste stream with both the interstitial fluids and formation minerals in the injection zone and the confining zone at expected temperature and pressures. The report should include anticipated reaction products. Reference the sources of this information. **Common reactions are listed in Procedure UICV-11, Procedure for Conducting A Compatibility Study for Class V Wells which can be found at: <http://www.kdheks.gov/uic/download/UICV-11.pdf>.**
8. Provide a report on the results of a corrosion test on all injection well components and appurtenances which will be in contact with the waste stream. Include the name of the manufacturer of the components. All materials must be compatible with the waste which the materials may be expected to come into contact. The materials shall be deemed to have compatibility as long as the materials meet or exceed standards developed for such materials by the American Petroleum Institute, the American Society for Testing Materials or comparable standards. Include a description of the methodology and procedures used to conduct the test and to make the compatibility determination. Include the manufacturer's test date for the injection tubing.
9. Injection Zone:

Formation(s) Name	Estimated Depth of Top*	Estimated Depth of Base*

Injection Interval:

Perf/Openhole _____ to _____, _____ to _____, _____ to _____*

*Provide reference point for these values.

10. Top hole elevation _____ (Top hole elevation of the proposed disposal well, with a closed traverse from U.S.G.S. or approved bench mark tied to the U.S.G.S. bench mark system.)
11. Well Completion: Provide borehole, casing, tubing, packer and cement information. The tubing and packer for new wells shall be new. Surface casing and longstring casing for new wells shall be new and cemented bottom to top by circulating. Sufficient cement shall be used to circulate to surface plus a minimum of 20% excess. The well shall be cased and

cemented such that: 1) injection fluids and injection zone or other formation fluids do not cause deterioration of the water quality of fresh and/or usable water zones, 2) the loss of

fresh and/or usable water due to downward migration is prevented, and 3) the release of injection fluids into an unauthorized zone is prevented.

Borehole Size	Casing/Tubing Size	Material	Weight Lbs/Ft	Casing Seat Depth	Joint Lengths	Type Cement	Amount Cement (sacks)	Cemented From	Interval To

Packer Grade and Type _____ Estimated Packer Setting Depth _____ *

*Provide reference point for these values.

12. Describe the maximum burst pressure, collapse pressure and tensile stress which may be experienced including calculations, methodology and references used to determine these. Provide the calculations, formulas, equations and methodology used to determine the casing, cementing, tubing, and packer are designed to tolerate the pressures or forces anticipated to the encountered or exerted on the well during construction, completion and operation. Include design factors used and provide references. The casing burst pressure, casing collapse pressure and the casing tension shall be calculated using performance properties listed in American Petroleum Institute (API) Bulletin 5C2. Well casing shall meet the specifications set out in API Specification 5CT. Submit service company recommendations along with studies to determine the suitability of the selected cements. Describe the type, grade, additives, slurry weight and expected compressive strength of the cement. Describe the cementing techniques and equipment including guideshoe, floatcollar, plugs, baskets, DV tools and their location. Describe the number and location of centralizers, wall scratchers, etc. Describe in detail the procedures to be used to ensure satisfactory cementing of the various casings and the remedial action to be taken if primary cementing results are not satisfactory.

13. Annulus Monitoring System: The annulus between _____ and _____ (pipe size) is to be monitored for leakage. Type of liquid in annulus _____. Proposed minimum annulus pressure is _____ psig. **(The minimum approvable annulus pressure is 40 psig.)** Provide an MSDS for any additives in the annulus liquid. **Provide design plans for the annulus seal pot monitoring system. (An acceptable design example is attached.)**

14. Liquid Injection Rate:

Liquid wastes to be injected at a minimum rate of _____ gallons/day to a maximum rate of _____ gallons/day. Provide a demonstration that the maximum injection rate is feasible.

15. Injection Pressure:

Disposal will be by means of gravity pressure (no pump pressure allowed) or _____ inches vacuum.

16. Discuss the proposed injection procedure for the well. Submit a flow diagram.

17. Surface Facilities:

Describe and provide design information and diagrams for all surface retention facilities, holding tanks, lines, transfer pumps and filters associated with the injection operation.

18. Spill Prevention:

Provide a detailed spill prevention and containment plan for the injection operation. Provide design plans for any spill containment structure(s).

19. Discuss how monitoring requirements for the injection operation will be met. Appropriate Gauges are required to monitor tubing pressure and annulus pressure. A meter is required to monitor flow rate and volume. Describe the meters and gauges that will be used for this purpose.

20. Provide a diagram indicating the location of all monitoring devices. Provide a quality assurance/quality control plan for obtaining reliable monitoring data. This includes method of calibration and frequency of calibration of gauges and meters. Include a waste analysis plan that describes the procedures and methods to be used to obtain representative samples of the injection fluid to meet monitoring requirements.

21. Describe where the injection fluid samples will be collected, the method used to collect the samples, sampling containers, sample storage, chain of custody procedures and the quality assurance/control procedures used. All analyses required by the UIC permit shall be conducted by a laboratory certified by the State of Kansas.

22. Provide a certificate of means of financial assurance the well will be properly plugged and abandoned at the end of its useful life or when required by KDHE to protect the public health, fresh and/or usable waters or soils. The use of ad valorem taxing authority for a local government subdivision of the state that owns or operates a public water supply treatment facility is acceptable. **Procedure # UICV-6, Procedure for Demonstrating Financial Assurance for a Class V Injection Well can be found at: <http://www.kdheks.gov/uic/download/UICV-6.pdf>.**

23. Provide a plugging and abandonment plan for the well. Include a diagram. Describe the type, grade, quality and estimated quantity of cement to be used in plugging. Describe the method of cement placement. Provide three cost estimates for plugging the well. **Procedure UICV-8, Procedure for the Plugging and Abandonment of a Class V Injection Well which can be found at: <http://www.kdheks.gov/uic/download/UICV-8.pdf>.**
24. Provide a plan for the testing program to determine the injection zone properties such as static fluid level, fluid pressure, and temperature.
25. Provide a schematic indicating the proposed well completion at the surface and subsurface.
26. Discuss the proposed injection interval stimulation program including fracture methods and chemical treatments.
27. Provide a plan for pressure testing the tubing/casing annulus for mechanical integrity. **Procedure # UICV-4, Procedure for the Pressure Mechanical Integrity Test for Evaluating Internal Mechanical Integrity of a Class Five Injection Well can be found at: <http://www.kdheks.gov/uic/download/UICV-4.pdf>.**
28. Discuss how drilling fluids and the formation cuttings will be contained and managed to prevent fresh water or soil contamination. Describe the dimensions of the drilling tank and the reserve tank. Provide a plan describing how the liquid and solid contents of the drilling tank will be disposed. Provide a plan describing how the fluids and formation cuttings in the reserve tank will be disposed.
29. Provide a plan for conducting the temperature log or oxygen activation log which is required to check for the absence of significant fluid movement behind the longstring casing. **Procedure # UICV-7, Procedure for Conducting the Temperature Log for Evaluating External Mechanical Integrity of a Class V Injection Well can be found at: <http://www.kdheks.gov/uic/download/UICV-7.pdf> and Procedure # UICV-5, Procedure for Conducting the Oxygen Activation (OA) Log for Evaluating External Mechanical Integrity of a Class V Injection Well can be found at <http://www.kdheks.gov/uic/download/UICV-5.pdf>.**
30. Provide a drilling prognosis for the well. This should include at a minimum the setting of casing, cementing, logging, coring and testing.

In addition, the permit will not become fully effective until the following have been received and approved by KDHE.

- a. A complete set of logs of the well. New wells should have a minimum of the following logs or similar type logs. An interpretation of the logs by a person with the technical expertise to interpret the logs shall also be submitted.

Surface Bore Hole:

1. Resistivity
2. Spontaneous Potential

Longstring Bore Hole (including borehole below longstring casing):

3. Directional or Inclination Survey
4. Gamma Ray-Neutron-Compensated Density
5. Caliper Log

Longstring Casing:

6. Cement Bond or equivalent log
- b. Complete casing and cementing information. Including cementing tickets, pipe tallies, work reports, and a drilling and completion history.
 - c. A discussion of the injection interval characteristics. Include fluid pressure, temperature and a description of the lithology of the injection interval.
 - d. A static fluid level measurement of the injection interval.
 - e. Supply a schematic drawing showing the actual well completion at the surface and subsurface, if different from the proposal.
 - f. Results of annulus pressure test.

AUTHORITY

To whom should future correspondence be addressed:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Signed

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information. K.A.R. 28-46-22 for a corporation requires this certification and this application be signed by a responsible corporate officer, such as President, Secretary, Treasurer or Vice-President of the corporation or other authorized signatory, and for a municipality by either a principal executive officer or ranking elected official.

Printed Name of Authorized Signatory

Signature of Authorized Signatory

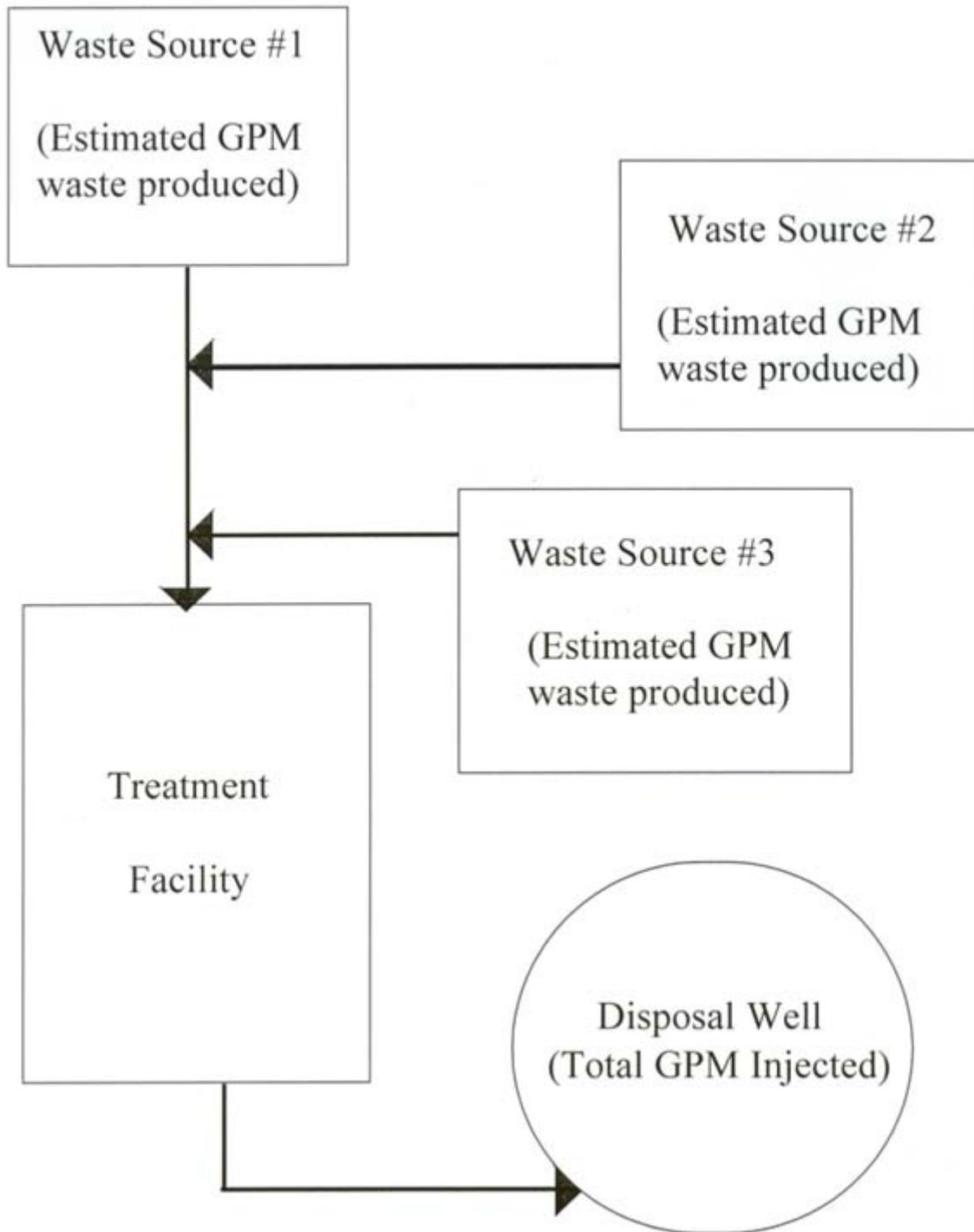
Company/Municipality

Title

Signatory Requirements for permit application are established in Procedure UICV-13, Procedure for Signatories to Permit Application and Monitoring Reports for Class V Disposal Well and can be found at:

<http://kdheks.gov/uic/download/UICV-13.pdf>

TYPICAL BLOCK DIAGRAM



ARTIFICIAL PENETRATION REVIEW

Control # _____

Status _____

Operator _____

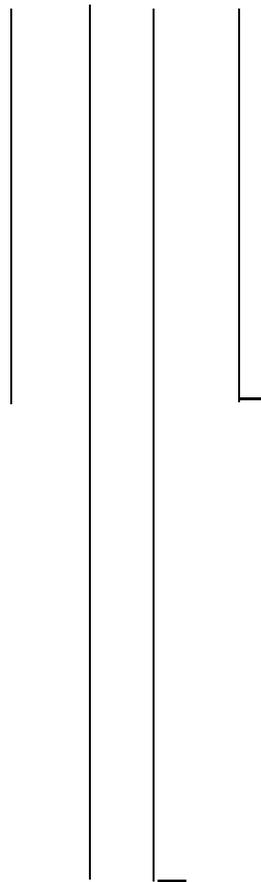
Distance from Injector _____

Lease _____

Well # _____

Location _____

WELL DIAGRAM



POTENTIAL PROBLEM: _____

TYPICAL ANNULUS SEAL POT

