



**CLASS I UNDERGROUND
INJECTION CONTROL (UIC) HAZARDOUS WASTE
INJECTION WELL APPLICATION FOR SUBSURFACE
DISPOSAL OF HAZARDOUS LIQUID INDUSTRIAL WASTE**

Important Notice: Any applicant seeking an exemption to the prohibition of the injection of hazardous waste shall submit a petition to the U.S. Environmental Protection Agency (EPA) demonstrating that, to a reasonable degree of certainty, there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. The injection of hazardous waste is not allowed until an exemption has been obtained from EPA. Petition standards and procedures are found at EPA regulations 40 CFR Part 148, Subpart C.

Submit UIC Permit Application to:
Kansas Department of Health & Environment
Division of Environment
Bureau of Water
Geology Section
1000 SW Jackson St, Suite 420
Topeka, Kansas 66612-1367

Date of Application: _____
KDHE UIC Permit No.: _____
Well(s)# _____

Legal Description: ___ 1/4 ___ 1/4 ___ 1/4
_____ Sec. _____, T _____ S, R _____ (E) (W)
_____ feet from south line of SE/4
_____ feet from east line of SE/4

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

County _____

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

Located on Indian lands: Yes ___ No ___

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

Facility Name, 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. List any permits or construction approvals received or applied for by the facility which are required under any of the following programs
 - Hazardous Waste Management program under the Resource Conservation Recovery Act (RCRA).
 - Underground Injection Control program under the Safe Drinking Water Act.
 - National Pollutant Discharge Elimination System program under the Clean Water Act
 - Prevention of Significant Deterioration (PSD) program under the Clean Air Act
 - Nonattainment program under the Clean Air Act
 - National Emission Standards for hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act.
 - Dredge and fill permits under section 404 of Clean Water Act.
 - Other relevant environmental permits, including State permits.
3. An owner or operator of any construction activity such as a new well or a combination of construction activities in a common plan of development who engages in construction activities which will disturb one (1) or more acres of soil needs to receive authorization from KDHE to discharge construction stormwater under the Kansas Construction Stormwater General Permit. Anyone who disturbs less than one (10 acre may also be required to obtain authorization to discharge construction stormwater runoff when KDHE believes the water quality Impact warrants consideration. Construction activities include construction of roads accessing the well site and construction of the well drilling pad. Information on construction stormwater permitting can be found at the following website: www.kdheks.gov/stormwater.
4. Provide up to four Standard Industrial Classification (SIC) codes which best reflect the principal products or services provided by the facility.
5. Describe all liquid waste 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. 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
6. Provide the determination that the wastewater is hazardous.
 7. Describe the sources, including individual processes, generating the various waste streams 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.
 8. Describe the current disposal method(s) for the waste(s) that is proposed to be injected.
 9. The use of industrial-waste disposal wells is considered only for those wastes for which it is not feasible to treat the waste and dispose by other means. Include a report of the results of studies of alternative treatment and disposal technologies and a justification of why subsurface disposal is considered the best method for disposal of the waste. Include a detailed cost estimate and a description of benefits and risks for each alternative. The report must address the requirements of the KDHE policy entitled **“Determination of the Types of Waste Eligible for Disposal into a Class I UIC Disposal Well”**. (A copy of the policy is attached.)
 10. Provide a certification that:
 - (1) The generator of the hazardous waste has a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable; and
 - (2) Injection of the waste is that practicable method of disposal currently available to the generator which minimizes the present and future threat to human health and the environment.
 11. 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.
 12. Provide the following:

Note: Seismic data may be necessary to characterize the subsurface geology if there is insufficient well control in the area.

- a. Provide discussion and supportive information demonstrating drilling the disposal well and injecting industrial waste into the subsurface stratum will not endanger or injure any mineral resources (coal, oil, gas, salt, sand, gravel, others) bearing formations. Include maps and sources for other supporting information.
- 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 2.5 mile radius area of review.
- d. Provide a clear, legible, detailed map with an appropriate scale. The 2.5 mile radius area of review must be drawn on the map. The following, if present within the area of review, must be drawn on the map.
 - the injection well to be permitted
 - all oil and gas producing wells
 - all inactive wells
 - injection wells
 - abandoned wells
 - dry holes
 - plugged wells
 - core holes
 - surface water bodies
 - springs
 - mines
 - quarries
 - water wells
 - monitoring wells
 - faults
 - linaments
 - other pertinent surface features

Provide a tabulation of data for all wells penetrating the injection zone and/or the confining 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 zone and/or the confining zone shall be provided if available. **A schematic indicating the current configuration of all wells penetrating the injection zone and/or confining zone shall be submitted.** 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 within the area of review. At a minimum the records of the following shall be reviewed:
- Kansas Department of Health and Environment
 - Kansas Geological Society
 - Kansas Geological Survey
 - Kansas Corporation Commission

Provide documentation that these sources were checked. Appropriately scaled aerial photos of the area of review shall also be examined for any indication of wells and the results reported. Copies of the aerial photos examined shall also be submitted. In addition, the location of each abandoned well penetrating the injection zone shall be physically inspected. The results of this inspection shall be documented and submitted to KDHE.

- f. Provide surface geologic maps, cross sections, and structural contour maps illustrating the regional geologic setting.
- g. Provide two cross-sections perpendicular to each other crossing at the proposed injection well location. These cross-sections shall include, at a minimum, available wire-line logs, geologic units and lithology from the surface to the base of the injection zone. The lines of the cross-sections should be shown on all structure maps. The cross-sections should contain the well numbers from the area of review map for reference.
- h. 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.
- i. Provide detailed discussion of the nature and areal development of upper and lower confining strata (lithology permeability, etc.).
- j. Provide descriptions and maps of faulting and fracturing or lineations in the area and discussion of the seismic history and activity of the area.
- k. Provide depositional and structural history of the area including lithology and hydrologic properties of all units penetrated by the proposed well.

- l. 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 injection interval
 - Isopach map of the injection interval
 - Structural contour map of the confining zone
 - Isopach map of confining zone
- m. 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.
- n. 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.
- o. Provide the predicted fracture pressure of injection interval. Provide the calculations and methodology used to determine the fracture pressure. Reference the sources of values used. One example of an acceptable equation for calculating the predicted fracture pressure is the Eaton Equation, as follows:

$$F = \left(\frac{S - P}{D} \right) \left(\frac{\nu}{1 - \nu} \right) + \frac{P}{D}$$

P = wellbore pressure, psi

D = depth, ft

S = overburden stress, psi

ν = Poisson's ratio

F = fracture gradient, psi/ft

- p. Calculate the predicted injection zone pressure build-up within a 2.5 mile radius of the proposed injection wellbore. Provide a pressure contour map for the area of review. Include calculation, 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.
- q. 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.

- r. Calculate the predicted distance of wastewater flow from the injection well. Include calculations, equations, parameters and sources of information used. This should be calculated for the expected life of the well.

r = radial distance of wastewater front from well

V = Qt = cumulative volume of injected wastewater (in cubic ft.)

- 13. 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. Common reactions are listed in (**Procedure # UICI-10, Procedure for Conducting A Compatibility Study for Class I Disposal Wells, which can be found at www.kdheks.gov/uic/download/UICI-10.pdf.**) Reference the sources of this information.
- 14. Provide a plan for conducting a study of compatibility of the waste with the interstitial fluids and formation minerals in the injection zone and the confining zone. (**Procedure # UICI-10, Procedure for Conducting A Compatibility Study for Class I Disposal Wells can be found at www.kdheks.gov/uic/download/UICI-10.pdf**) Include the name of the laboratory that will be used for any core sample analysis and formation fluid testing.
- 15. 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.
- 16. Injection Zone:

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

Injection Interval:

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

Injection Interval:

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

*Provide reference point for these values.

17. 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.)
18. 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)	Cement Interval from	to

Packer Grade and Type _____ Estimated Packer Setting Depth _____ *

*Provide reference point for these values.

19. Describe the maximum burst pressure, collapse pressure and tensile stress which may be experienced including calculations, methodology and reference 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 be encountered or exerted on the well during construction, completion and operation. Include design factors used and provide references. **If there is the potential for significant variance in the temperature of the injection fluid, provide information demonstrating this has been accounted for in the injection tubing and packer design.** 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 guide shoe, float collar, plugs, baskets D V tools and their location. Describe the number and location of the 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.

20. Annulus Monitoring System: The annulus between _____ and _____ (pipe size) is to be monitored for leaks. Type of liquid in annulus _____. Proposed minimum annulus pressure is _____ psig. **(The minimum approvable annulus pressure is 60 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.)**

21. 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.

22. Injection Pressure:

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

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

24. 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.

25. Spill Prevention:

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

26. Environmental Remedial Action:

Should fresh or usable water or the soils become contaminated by a failure of the injection facilities, the permittee is responsible for investigating the contamination and any required remediation of the contamination. The permittee will be required to sign an agreement with KDHE which will establish guidelines and objectives for investigation and remediation of the contamination. Provide acknowledgement of this requirement.

27. Discuss how monitoring requirements for the injection operation will be met.

Both electronic continuous recording devices and gauge or meters are required to monitor tubing pressure, flow rate, volume and annulus pressure. Describe the meters or gauges and continuous recording devices that will be used to measure and record injection volume, injection rate, annulus pressure and tubing vacuum. The monitoring system shall include:

- (1) Automatic alarm and automatic shut-off systems, designed to sound and shut-in the well when pressures and flow rates or other parameters approved by the Director exceed a range and/or gradient specified in the permit; or
- (2) Automatic alarms, designed to sound when the pressures and flow rates or other parameters approved by the Director exceed a rate and/or gradient specified in the permit, in cases where the owner or operator certifies that a trained operator will be on-site at all times when the well is operating.

28. 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, meters and continuous recording devices. Include a waste analysis plan that describes the procedures and methods to be used to obtain representative samples of the waste to meet monitoring requirements.

29. Describe where the injection fluid samples will be collected for monitoring purposes, 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.

30. For corrosive waste, continuous corrosion monitoring is required. Provide a detailed plan for meeting this requirement.

31. Provide a demonstration that the applicant has the resources necessary to close, plug or abandon the well and for post-closure care.
32. Provide a closure plan that complies with the requirements of KDHE regulation K.A.R. 28-46-34, which replaces EPA regulation 40 CFR 146.71 Closure.
33. Provide a post closure care plan that complies with the requirements of KDHE regulation K.A.R. 28-46-34, which replaces EPA regulation 40 CFR 146.72 Post-Close Care.
34. Provide a detailed plan for the testing program to determine the injection zone properties such as static fluid level, fluid pressure, and temperature.
35. Describe the procedure to be used to obtain a representative sample of the injection zone fluid. Describe the quality assurance/quality control that will be exercised in the collection, storage and transportation of the sample to a Kansas certified laboratory for analysis. Provide the name of the laboratory that will conduct the analyses. A list of the constituents for which the sample shall be analyzed is attached.
36. Provide a schematic indicating the proposed well completion at the surface and subsurface.
37. Discuss the proposed injection interval stimulation program including fracture methods and chemical treatments.
38. 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 # UICI-9, Procedure for Conducting the Temperature Log for Evaluating External Mechanical Integrity of a Class I Waste Well can be found at www.kdheks.gov/uic/download/UICI-9.pdf. In addition Procedure # UICI-3, Procedure for Conducting the Oxygen Activation (OA) Log Procedure for Evaluating External Mechanical Integrity of a Class I Waste Disposal Well can be found at www.kdheks.gov/uic/download/UICI-3.pdf.)**
39. Provide a plan for testing the bottom-hole cement by means of an approved radioactive tracer survey.
40. Provide a plan for pressure testing the tubing/casing annulus for mechanical integrity. **(Procedure # UICI-6, Procedure for the Pressure Mechanical Integrity Test for Evaluating Internal Mechanical Integrity of a Class I Disposal Well can be found at www.kdheks.gov/uic/download/UICI-6.pdf.)**
41. Provide a plan for conducting the pressure fall-off test that is required to determine injection zone characteristics. **(Procedure # UICI-2, Formation Pressure Fall-Off Test and Testing Plan Development Procedures for a Class I Disposal Well can be found at www.kdheks.gov/uic/download/UICI-2.pdf.)**

42. 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.
43. Provide a drilling prognosis for the well. This should include at a minimum the settings of casing, cementing, logging, coring and testing.
44. Describe the rock coring program. Include a representative well log with proposed core intervals indicated. At the minimum a core of a representative shale in the confining zone and a core of the injection interval must be obtained.
45. Describe the core testing procedures. The cores shall be analyzed for permeability, porosity and density and the lithology shall be described.

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. Caliper
2. Resistivity
3. Spontaneous Potential

Surface Casing:

4. Cement Bond and Variable Density or similar type log approved by KDHE

Longstring Bore Hole (including borehole below longstring casing):

5. Resistivity
6. Spontaneous Potential
7. Directional or Inclination Survey
8. Caliper
9. Gamma Ray-Neutron-Compensated Density
10. Fracture Finder

Longstring Casing:

11. Cement Bond and Variable Resistivity or similar type log approved by KDHE
 12. Electromagnetic Casing Inspection or similar type log approved by KDHE
- B. Complete casing and cementing information. Including cementing tickets, pipe tallies, work reports, and a drilling and completion history.
 - C. A chemical analysis of the injection interval fluid. Include partial chemical, heavy metals, VOC, temperature and pH analyses. All analyses shall be conducted by a laboratory certified by the State of Kansas.
 - D. A discussion of the injection interval characteristics. Include fluid pressure and temperature and describe the lithology of the injection zone. A core of the injection interval must be taken and the permeability, porosity and density determined and the lithology described.
 - E. Results of the pressure fall-off tests including an interpretation by a person with the technical expertise to evaluate the data.
 - F. A static fluid level measurement of the injection interval.
 - G. A description of the characteristics of the confining zone. A core of the confining zone must be taken and the permeability, porosity and density determined and the lithology described.
 - H. Supply a schematic drawing showing the actual well completion at the surface and subsurface.
 - I. Results and interpretation of a test of compatibility between the fluids to be injected and the injection interval fluids and matrix minerals at the determined temperature and pressure.
 - J. Revised calculations of predicted reservoir pressure build-up at a 2.5 mile radius from the injection well based on actual injection zone properties determined from the formation testing program. Include calculations, equations and parameters. This should be calculated for the expected life of the well.
 - K. Revised calculations of the cone of influence based on actual injection zone properties determined from the formation testing program. Include calculations equations and parameters. This should be calculated for the expected life of the well.

- L. Revised calculation of distance of wastewater flow from the injection well based on actual injection zone properties obtained from formation testing program.
- M. Results of annulus pressure test and the test to check for fluid migration behind the casing. Results shall be submitted in the format described in Departmental guidelines.

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direct 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 requires this certification and this application be signed by a responsible corporate officer, such as a President, Secretary, Treasurer or Vice-President of the corporation or other authorized signatory as described at the Code of Federal Regulations 40 CFR 144.32.

Printed Name of Authorized Signatory

Signature of Authorized Signatory	Company	Title
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Effective 8/1/09

ATTACHMENT "A"
 COMPOUNDS REQUIRING ANALYSIS
 FOR CLASS I DISPOSAL WELLS

1. VOLATILE ORGANIC

COMPOUNDS (Method 624-Purge & Trap GC/MS) Detection limits nominally 10 ug/L for Acrolein and Acrylonitrile at 100 ug/L.

Acrolein
 Acrylonitrile
 Benzene
 Bromomethane
 Bromodichloromethane
 Bromoform
 Carbon Tetrachloride
 (Tetrachloromethane)
 Chlorobenzene
 Chloroethane
 2-Chloroethylvinlyl ether
 Chloroform
 Chloromethane (Methylchloride)
 Dibromochloromethane
 1,1-Dichloroethane
 1,2-Dichloroethane
 1,1-Dichloroethene
 trans-1,2-Dichloroethane
 1,2-Dichloropropane
 Cis-1,3-Dichloropropane
 trans-1,3-Dichloropropane
 Ethylbenzene
 Methylene chloride
 (dichloroemethane)
 1,1,2,2-Tetrachloroethane
 1,1,1-Trichloroethane
 1,1,2-Trichloroethane
 Trichloroethane
 Trichlorofluoromethane
 Toluene
 Vinyl Chloride

2. ACID ORGANIC COMPOUNDS

(Method 625-Extractions GC-MS)
 Detection limits nominally 25 ug/L except for dinitro compounds at 250 ug/L

4-Chloro-3-methylphenol
 2-Chlorophenol
 2,4-Dichlorophenol
 2,4-Dimethylphenol
 2-Methyl-4,6-dinitrophenol
 2-Nitrophenol
 4-Nitrophenol
 Pentachlorophenol
 Phenol
 2,4,6-Trichlorophenol

3. BASE/NEUTRAL ORGANIC

COMPOUNDS (Method 625-Extraction GC/MS) Detection limits nominally 10 ug/L

A. Polynuclear Aromatics
 Acenaphthene

Acenaphthylene
 Anthracene
 Benzo (a) anthracene
 Benzo (b) fluoranthene
 Benzo (a) fluoranthene
 Benzo (a) pyrene
 Benzo (g,h,i) perylene
 Chrysene
 Dibenzo (a,h) anthracene
 Fluoranthene
 Fluorene
 Indeno (1,2,3-cd) pyrene
 Naphthalene
 Phenanthrene
 Pyrene

B. Ethers & Esters

Bis (2-chloroethyl) ether
 Bis (2-chloroethoxy) methane
 Bis (2-ethylhexyl) phthalate
 Bis (2-chloroisopropyl) ether
 4-Bromophenyl phenyl ether
 Butyl benzyl phthalate
 4-Chlorophenyl phenyl ether
 Diethylphthalate
 Dimethylphthalate
 Dioctylphthalate
 Di-n-butylphthalate
 Isophorone

C. Nitrogen Containing Compounds

Benzidine
 2,4-Dinitrotoluene
 2,6-Dinitrothlune
 1,2-Diphenylhydrazine Nitrobenzene
 N-Nitrosodimethylamine
 N-Nitrosodi-n-proplamine
 N-Nitrosodiphenylamine

D. Chlorinated Hydrocarbons

2-Chloronaphthalene
 1,3-Dichloronbenzene
 1,4-Dichloronbenzene
 3,3-Dichloronbenzidine
 Hexachlorobenzene
 Hexachlorobenzidine
 Hexachloroethane
 Hexachlorocyclopentadiene
 2,3,7,8-Tetrachlorodibenzo-p-dioxin
 1,2,4-Trichlorobenzene

4. PESTICIDE COMPOUNDS (Method

625-Extraction GC/EC) Detection limits nominally 0.01 ug/L

Aldrin
 α -BHC
 β -BHC
 δ -BHC
 γ -BHC
 Chlorodane
 4,4'-DDD

4,4'DDD
 4,4'DDT
 Dieldrin
 Endosulfan I
 Endosulfan II
 Endosulfan Sulfate
 Endrin
 Endrin Aldehyde
 Heptachlor Expoxide
 Toxaphene
 PCB-1016
 PCB-1221
 PCB-1232
 PCB-1242
 PCB-1248
 PCB-1254
 PCB-1260

5. HEAVY METALS

Antimony
 Arsenic
 Beryllium
 Cadmium
 Chromium
 Copper
 Lead
 Mercury
 Nickel
 Selenium
 Silver
 Thallium
 Zinc

6. MISCELLANEOUS

Cyanides
 Phenols

7. GEOCHEMICALS

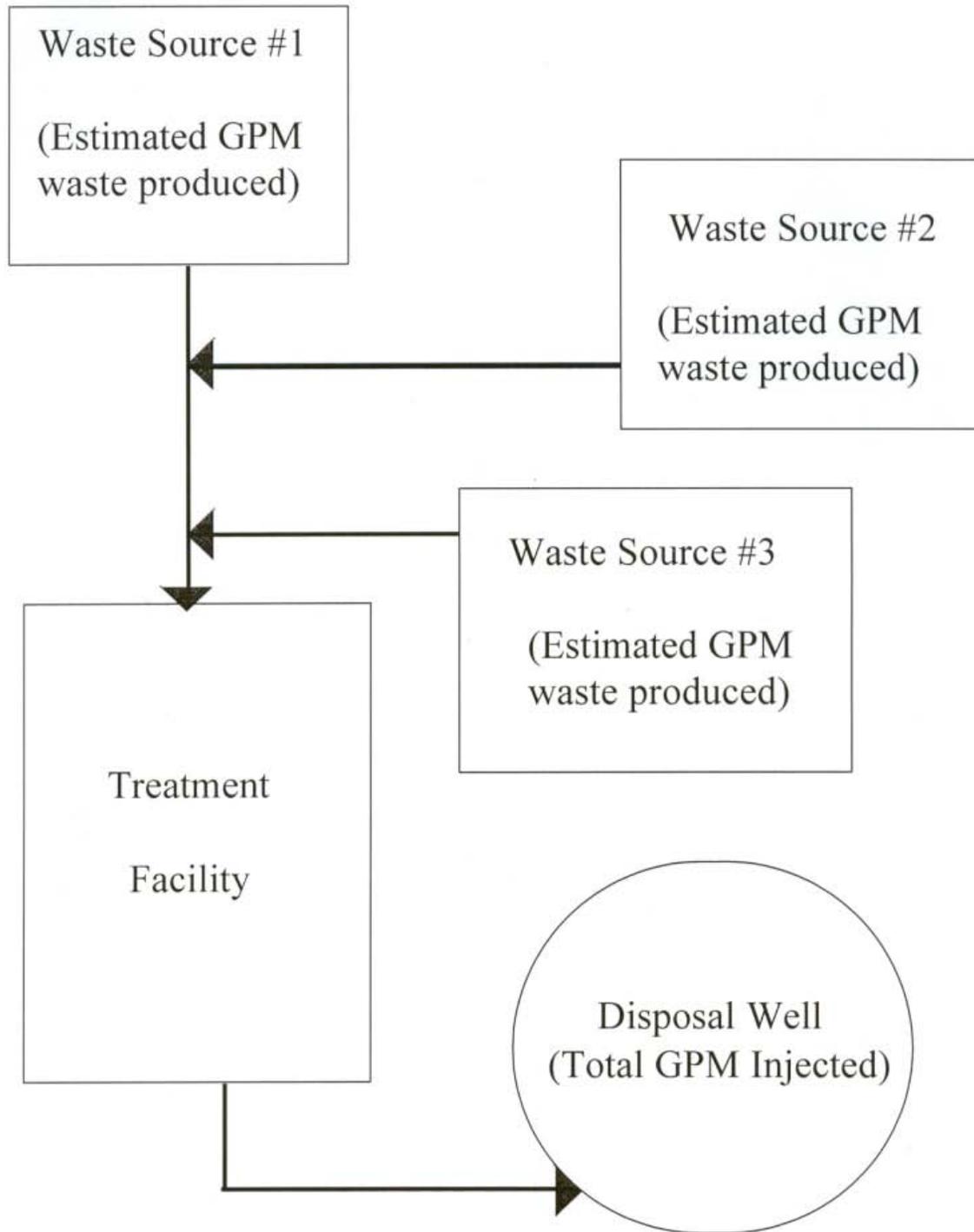
Total Hardness (CaCO₃)
 Calcium
 Sodium
 Magnesium
 Potassium
 Total Alkalinity
 Chloride
 Sulfate
 Fluoride
 Nitrate
 Iron
 Manganese
 Ammonia
 Phosphate
 Silica
 Specific Conductance
 Total Dissolved Solids
 Total Suspended Solids
 Oil and Grease

Attachment "A" (continued)
TCLP REQUIREMENTS

The following constituents are regulated under the Toxicity Characteristic rule. The Waste Stream must be analyzed for these constituents using the Toxicity Characteristic Leaching Procedure (TCLP).

Benzene
Carbon tetrachloride
Chlordane
Chlorobenzene
Chloroform
m-Cresol
o-Cresol
p-Cresol
1,4-Dichlorobenzene
1,2-Dichloroethane
1,1-Dinitrotoluene
2,4-Dinitrotoluene
Heptachlor (and its hydroxide)
Hexachloro-1,3-butadiene
Hexachlorobenzene
Hexachloroethane
Methylethylketone
Nitrobenzene
Pentachlorophenal
Pyridine
Tertachloroethylene
Trichloroethylene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
Vinyl chloride
Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver
Endrin
Lindane
Methoxchlor
Toxaphene
2,4-Dichlorophenoxyacetic acid
2,4,5-Trichlorophenoxypropionic acid

TYPICAL BLOCK DIAGRAM





State of Kansas

Joan Finney, Governor
Department of Health and Environment
Division of Environment

Stanley C. Grant, Ph.D., Secretary
Acting

Forbes Field, Bldg. 740, Topeka, KS 66620-0001

Response to 913-296-5560
FAX (913) 296-6247

FROM: Karl W. Mueldener, P.E. *Karl W. Mueldener* Policy Memorandum #91-1
Director, Bureau of Water February, 1991

SUBJECT: Determination of the Types of Wastes
Eligible for Disposal into Class I
Underground Injection Control (UIC) Disposal Wells

PURPOSE:

To state the Bureau of Water policy for determining the types of wastes, excluding oil field brines regulated by the Kansas Corporation Commission, that are eligible for disposal through the use of Class I UIC disposal wells. The Bureau's objective is to protect against contamination of water and soil resources by ensuring compatibility of the injected waste with the well components, injection and confining zones and to use subsurface formations only for the disposal of those wastes that can not feasibly be treated, stored or disposed by other methods.

BACKGROUND:

The Bureau of Water administers the Class I UIC program developed pursuant to K.S.A. 65-171d. A major function of the program is to ensure the injection of waste is done in a controlled manner that will: 1) protect the soils and waters of the state from contamination, 2) protect human health, 3) conserve the water resources of the state, 4) encourage alternatives to the injection of wastes, and 5) use subsurface formations only for the disposal of those wastes that can not feasibly be treated, stored or disposed by other methods.

POLICY:

The use of Class I UIC disposal wells will be considered only for those wastes that cannot feasibly be treated, stored or disposed by other methods. Therefore, each new application for the disposal of wastes shall be accompanied by a report 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.

In the even the applicant receives a Class I UIC permit, the permittee will be expected to develop, periodically update, and implement an ongoing waste minimization program which addresses the wastes being directed to the Class I UIC disposal well(s).

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Charles Konigsberg, Jr., M.D., M.P.H.,
Director of Health
(913) 296-1343

Director of Environment
(913) 296-1535

Lorne Phillips, Ph.D.,
Director of Information
Systems
(913) 296-1415

Roger Carlson, Ph.D.,
Director of the Kansas Health
and Environmental Laboratory
(913) 296-1620

The applicant will be required to use the most secure compatible disposal formation available. This will typically be one of the deeper formations such as the Arbuckle.

EFFECTIVE DATE:

The above policy will be in effect on February 1, 1991, and will remain in effect until withdrawn, revised, or modified by the Director.

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TYPICAL ANNULUS SEAL POT

