BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

GLEN'S 66,	)	
	)	
Petitioner,	)	
	)	
v.	)	PCB 04-198
	)	(UST Appeal)
ILLINOIS ENVIRONMENTAL	)	
PROTECTION AGENCY,	)	
	)	
Respondent.	)	

NOTICE OF FILING

TO: John Kim
Special Assistant Attorney General
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

PLEASE TAKE NOTICE that on May 11, 2004, filed with the Clerk of the Illinois Pollution Control Board of the State of Illinois an original, executed copy of a Petition for Review of Illinois Environmental Protection Agency Decision.

Dated: May 11, 2004

Respectfully submitted,

Glen's 66

By: Carolyn S Hesse
One of Its Attorneys

Carolyn S. Hesse
Barnes & Thornburg LLP
One North Wacker Drive
Suite 4400
Chicago, Illinois 60606
(312) 357-1313
218315v1

CERTIFICATE OF SERVICE

I, on oath state that I have served the attached Petition for Review of Illinois Environmental Protection Agency Decision by placing a copy in an envelope addressed to:

John Kim
Special Assistant Attorney General
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

from One North Wacker Drive, Suite 4400, Chicago, Illinois, before the hour of 5:00 p.m., on this 11th Day of May, 2004.

Carolyn S. Hesse

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

GLEN'S 66,	)	
	)	
Petitioner,	)	
	)	
v.	)	PCB 04-198
	)	(UST Appeal)
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
	)	
	)	
Respondent.	)	

PETITION FOR REVIEW OF ILLINOIS ENVIRONMENTAL PROTECTION AGENCY DECISION

Glen's 66 ("Glen's 66"), by its attorney, Carolyn S. Hesse of Barnes & Thornburg LLP, pursuant to the Illinois Environmental Protection Act, 415 ILCS 5/1 *et. seq.* (the "Act") and 35 Illinois Administrative Code Section 105.400 *et. seq.*, hereby appeals certain decisions by the Illinois Environmental Protection Agency (the "Agency").

1. Glen's 66 ("Petitioner") was the owner of a gasoline service station that was located at 209 West Main Street, Coffeen, Montgomery County, Illinois (the "Station"). This gasoline service station had underground storage tanks (UST's) on the property, which stored gasoline.
2. LUST Incident Number 991539 was obtained following a site investigation. The site has also been assigned LPC #1350155004-Montgomery County.
3. On January 23, 2003, CW^3M, the contractor hired by Petitioner to assist Petitioner with corrective action at the Station, sent to the Agency a High Priority Corrective Action Plan ("HPCAP") and Budget to perform

corrective action at the Station. The Agency received the HPCAP on January 23, 2003.

4. On April 8, 2004, the Agency sent a letter to Petitioner modifying the January 23, 2003 High Priority Corrective Action Plan and Budget. (*See* Exhibit A.) The letter included a list of modifications made by the Agency. For the majority of the modifications, the Agency's letter stated that modifications were made because the "costs were not reasonable as submitted."

5. It appears that, when determining whether to consider certain costs "reasonable," the Agency used rate sheets even though the Illinois Pollution Control Board (the "Board") had earlier decided *Illinois Ayres Oil Company v. IEPA*, PCB 03-214, decided April 1, 2004. In *Ayres*, the Board described the rate sheets as invalid rules and determined that the Board was not obligated to follow the rate sheets.

6. The Agency's April 8, 2004, letter also disapproved the proposed biomass injection trench and piping even though the Agency had approved this type of *in situ* treatment system on prior occasions. The Agency's April 8, 2004, letter failed to explain why the biomass injection trench was not approved.

7. The Agency's letter of April 8, 2004, provides no additional information regarding why IEPA modified the HPCAP or believes that costs are not reasonable.

8. Some of the Agency's modifications also contained the following sentence: "Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable."

9. However, the Agency's April 8, 2004 letter also states that the Agency's decision is a final decision, appealable to the Illinois Pollution Control Board. Thus, in order to preserve Petitioner's rights and to appeal the Agency's decisions, Petitioner is appealing the Agency decisions set forth in the Agency's letter dated April 8, 2004.

WHEREFORE, Glen's 66 respectfully requests that the Board enter an order requiring the Agency to approve the High Priority Corrective Action Plan and Budget to allow the cleanup to proceed at this facility and for Glen's 66's attorneys' fees and costs in bringing this appeal.

Respectfully submitted,

Glen's 66

By: Carolyn S Hesse
One of Its Attorneys

Carolyn S. Hesse, Esq.
Barnes & Thornburg LLP
One North Wacker Drive
Suite 4400
Chicago, Illinois 60606
(312) 357-1313
218439v1

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276. 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601. 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

217/782-6762

CERTIFIED MAIL
7002 3150 0000 1257 0234

APR 0 8 2004

Glen Crocks
900 East Columbia
Litchfield, IL 62056

Re: LPC #1350155004 -- Montgomery County
Coffeen/Glen's 66
209 West Main Street
LUST Incident No. 991539
LUST Technical File

Dear Mr. Crocks:

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed the High Priority Corrective Action Plan (plan) submitted for the above-referenced incident. This plan, dated January 23, 2003, was received by the Illinois EPA on January 23, 2003. Citations in this letter are from the Environmental Protection Act (Act) and 35 Illinois Administrative Code (35 Ill. Adm. Code).

Pursuant to Section 57.7(c)(4) of the Act and 35 Ill. Adm. Code 732.405(c), the plan is modified. The following modifications are necessary, in addition to those provisions already outlined in the plan, to demonstrate compliance with Title XVI of the Act and 35 Ill. Adm. Code 732:

1. The installation of the biomass injection trench and piping is not approved.

2. Monitoring well MW-1 must be replaced upon completion of the backfilling activities. The replacement well must be sampled as part of the post-soil remediation groundwater sampling.

3. Groundwater samples must be analyzed for lead. A determination about the groundwater lead being the result of background will be made upon receipt of the post-soil remediation groundwater sampling data.

4. Corrective action plans proposing bioremediation must taken into consideration the factors listed in the attached Illinois EPA Fact Sheet "Feasibility and Design Determination for Bioremediation" dated March 2004.

EXHIBIT
A

Please note that all activities associated with the remediation of this release proposed in the plan must be executed in accordance with all applicable regulatory and statutory requirements, including compliance with the proper permits.

In addition, the budget for the High Priority Corrective Action Plan is modified pursuant to Section 57.7(c)(4) of the Act and 35 Ill. Adm. Code 732.405(c). Based on the modifications listed in Section 2 of Attachment A, the amounts listed in Section 1 of Attachment A are approved. Please note that the costs must be incurred in accordance with the approved plan. Be aware that the amount of reimbursement may be limited by Sections 57.8(e), 57.8(g) and 57.8(d) of the Act, as well as 35 Ill. Adm. Code 732.604, 732.606(s), and 732.611.

Please note that, if the owner or operator agrees with the Illinois EPA's modifications, submittal of an amended plan and/or budget, if applicable, is not required (Section 57.7(c)(4) of the Act and 35 Ill. Adm. Code 732.503(f)). Additionally, pursuant to Section 57.8(a)(5) of the Act and 35 Ill. Adm. Code 732.405(e), if reimbursement will be sought for any additional costs that may be incurred as a result of the Illinois EPA's modifications, an amended budget must be submitted.

NOTE: Amended plans and/or budgets must be submitted and approved prior to the issuance of a No Further Remediation (NFR) Letter. Costs associated with a plan or budget that have not been approved prior to the issuance of an NFR Letter will not be reimbursable.

All future correspondence must be submitted to:

Illinois Environmental Protection Agency
Bureau of Land - #24
Leaking Underground Storage Tank Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, IL 62794-9276

Please submit all correspondence in duplicate and include the Re: block shown at the beginning of this letter.

An underground storage tank system owner or operator may appeal this decision to the Illinois Pollution Control Board. Appeal rights are attached.

The development of risk-based remediation objectives may be appropriate to demonstrate adequate protection of human health and the environment for this LUST incident. Engineered barriers, institutional controls which prohibit the use of groundwater as potable water, land use restrictions, environmental land use controls, or highway authority agreements may be appropriate at this facility to provide adequate protection for human health and the environment.

Personnel of the Illinois EPA Leaking Underground Storage (LUST) Section would be glad to hold a meeting or telephone conference with you and your environmental consultant to review

the items discussed in this letter and to discuss corrective action options available to you pursuant to the Environmental Protection Act (Act) as amended by Public Act 92-0554 on June 24, 2002, the LUST regulations (35 Ill. Adm. Code 731 and 732) and the Tiered Approach to Corrective Action Objectives (TACO) rules (35 Ill. Adm. Code 742).

If you have any questions or need further assistance, please contact the Illinois EPA project manager, Steve Jones, at 217/524-1253.

Sincerely,

Hernando A. Albarracin
Unit Manager
Leaking Underground Storage Tank Section
Division of Remediation Management
Bureau of Land

HAA:SJ\Glen's 66 (991539) CAP 1.doc

Attachments: Attachment A
Illinois EPA Fact Sheet "Feasibility and Design Determination for Bioremediation" dated March 2004
Appeal Rights

c: CW3M Company, Inc.
Division File

Attachment A

Re: LPC #1350155004 -- Montgomery County
Coffeen/Glen's 66
209 West Main Street
LUST Incident No. 991539
LUST Technical File

Citations in this attachment are from the Environmental Protection Act (Act) and 35 Illinois Administrative Code (35 Ill. Adm. Code).

SECTION 1

The budget was previously approved for:

$12,274.00	Investigation Costs
$3,569.00	Analysis Costs
$10,400.00	Personnel Costs
$535.00	Equipment Costs
$2,037.26	Field Purchases and Other Costs
$1,837.12	Handling Charges

As a result of the Illinois EPA's modification(s) in Section 2 of this Attachment A, the following amounts are approved:

$3,205.00	Investigation Costs
$3,853.00	Analysis Costs
$14,948.00	Personnel Costs
$807.00	Equipment Costs
$199,298.22	Field Purchases and Other Costs
$9,723.06	Handling Charges

Therefore, the total cumulative budget is approved for:

$15,479.00	Investigation Costs
$7,422.00	Analysis Costs
$25,348.00	Personnel Costs
$1,342.00	Equipment Costs
$201,335.48	Field Purchases and Other Costs
$11,560.18	Handling Charges

SECTION 2

1. $10.00 for an adjustment in mobilization costs. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill.

Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

2. $122.00 for an adjustment in costs for monitoring well materials. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

3. $5.00 for an adjustment in costs for pH sample. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

4. $7.00 for an adjustment in costs for painter filter sample. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

5. $5.00 for an adjustment in costs for flash point sample. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

6. $1,880.00 for an adjustment in costs for biofeasibility sample testing. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

7. $63,277.00 for an adjustment in personnel costs. The Illinois EPA has determined that

these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

8. $175.00 for an adjustment in PID (photoionization detector) costs. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

9. $21.00 for an adjustment in costs for measuring wheel. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable. In addition, these costs are indirect corrective action costs. Indirect corrective action costs for personnel, materials, service, or equipment charged as direct costs are ineligible for payment from the Fund (Section 57.5(a) of the Act and 35 Ill. Adm. Code 732.606(v)).

10. $21.00 for an adjustment in costs for Encore Sampler Tool. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable. In addition, these costs are indirect corrective action costs. Indirect corrective action costs for personnel, materials, service, or equipment charged as direct costs are ineligible for payment from the Fund (Section 57.5(a) of the Act and 35 Ill. Adm. Code 732.606(v)).

11. $2,921.20 for an adjustment in mileage costs. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

12. $400.00 for an adjustment in costs for building demolition and asbestos inspection. The Illinois EPA has determined that these costs are not reasonable as submitted (Section

57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

13. $3,015.10 for an adjustment in costs for soil excavation, transportation and disposal. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

14. $28,617.22 for an adjustment in costs for backfilling. The Illinois EPA has determined that these costs are not reasonable as submitted (Section 57.7(c)(4)(C) of the Act and 35 Ill. Adm. Code 732.606(hh)). One of the overall goals of the financial review is to assure that costs associated with materials, activities, and services are reasonable (35 Ill. Adm. Code 732.505(c)). Please note that additional information and/or supporting documentation may be provided to demonstrate the costs are reasonable.

15. $1,500.00 for an adjustment in costs for biomass injection trench. The installation of the biomass injection trench is not approved. These costs are for activities in excess of those necessary to meet the minimum requirements of Title XVI of the Act (Section 57.5(a) of the Act) and 35 Ill. Adm. Code 732 (Section 732.505(c)). Costs for corrective action activities and associated materials or services exceeding the minimum requirements necessary to comply with the Act are not eligible for reimbursement from the Fund (35 Ill. Adm. Code 732.606(o)).

Appeal Rights

An underground storage tank owner or operator may appeal this final decision to the Illinois Pollution Control Board pursuant to Sections 40 and 57.7(c)(4)(D) of the Act by filing a petition for a hearing within 35 days after the date of issuance of the final decision. However, the 35-day period may be extended for a period of time not to exceed 90 days by written notice from the owner or operator and the Illinois EPA within the initial 35-day appeal period. If the owner or operator wishes to receive a 90-day extension, a written request that includes a statement of the date the final decision was received, along with a copy of this decision, must be sent to the Illinois EPA as soon as possible.

For information regarding the filing of an appeal, please contact:

Dorothy Gunn, Clerk
Illinois Pollution Control Board
State of Illinois Center
100 West Randolph, Suite 11-500
Chicago, IL 60601
312/814-3620

For information regarding the filing of an extension, please contact:.

Illinois Environmental Protection Agency
Division of Legal Counsel
1021 North Grand Avenue East
Post Office Box 19276
Springfield, IL 62794-9276
217/782-5544

Illinois
Environmental
Protection Agency

Bureau of Land
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

March 2004

Feasibility and Design Determination for Bioremediation

Purpose

This document is designed to aid in the review of sites proposing bioremediation as a means of corrective action. Each feasibility and design criteria must be considered in the design of a corrective action plan proposing bioremediation.

General Applicability

Contaminant Plume:

Soil and groundwater contaminant plume should be defined.

Free Product:

Free Product should not be present in area to be remediated.

Hydraulic Conductivity:

Should be greater than 1×10^{-7}. All contaminated saturated zones must be tested.

pH of groundwater:

Should be between 6.0 and 8.0. Tested from upper foot of groundwater, within area of highest impact.

Total Microbial Plate Count:

One soil sample must be taken at or below the groundwater surface, located in an area of little or no impact. Results should be greater than 1,000 CFU (colony forming units).

Soil Porosity:

One soil sample from the contaminated zone should be analyzed to determine soil porosity.

Heavy Metals:

Results for heavy metals should be below 10mg/l for iron; 20 mg/l for copper; 20 mg/l for zinc, and 900 mg/l for lead. Additionally, total heavy metals should not exceed 2500 mg/l.

Oxygen Demand:

For contaminant plumes of ½ acre or less, five borings should be completed and groundwater and soil samples collected. One boring should be located at the highest gradient of the plume, one from lowest gradient, and three across the center of the plume. These samples should be tested for Total Petroleum Hydrocarbon, Chemical Oxygen Demand, and Heavy Metals.

Contaminant plumes larger than 1/2 acre should add one more boring (one soil and one groundwater sample) per additional ½ acre.

Design Considerations

Determine Mass of Contaminants

The mass of contaminants (measured by the higher amount of Total Petroleum - Hydrocarbons (TPH) or Chemical Oxygen Demand (COD)) to be treated must be determined in both soil and groundwater. Sampling will determine the concentration of contaminants present in the soil and groundwater. To estimate the total amount of oxygen required to remediate the contaminants, the following example can be followed:

Assume average concentration in soil and groundwater (TPH or COD) = 10 ppm
Assume volume of contaminated mass (size of plume) in cubic yards = 1,000 (cy)
A cubic yard of clay (saturated) weighs 118 #/ft^3 = 3200#
A cubic yard of sand (saturated) weighs 124 #/ft^3 = 3350#

The total mass of contaminants requiring treatment (clay):
$10/(1 \times 10^6) \times 3200$ #/cy x 1000 cy = 32 #'s
(10 ppm = $10/(1 \times 10^6)$)

Estimate of Oxygen Requirement

Based on the extent of contamination and total mass of contaminants, the required oxygen demand can be calculated. COD or TPH need to be considered in order to determine the total amount of oxygen required for degradation of contaminants. As a rule of thumb, 3 lbs of oxygen are required per lb of hydrocarbon to be remediated. Benzene can be used as an example to determine the mass ratio of oxygen to hydrocarbon.

Oxidation Equation: $C_6H_6 + 7.5\ O_2 = 6CO_2 + 3\ H_2O$
$(12*6)+(1*6)=78$ $7.5\ (16*2)=240$

If benzene were the only contaminant present it would take 240 lbs of oxygen to completely degrade 78 lbs of benzene. Meaning 3 lbs (240/78 = 3.08) of oxygen are required to completely degrade each lb of benzene. For a leaking UST site we must consider all contaminants that will use oxygen in calculating the oxygen requirement. Example:

Total mass of contaminants from above = 32 #
Required Oxygen= 32 # * 3#/# = 96 lb.

If you assume the oxygen delivery product provides 10 % by weight it is capable of delivering .1 #'s of oxygen. therefore:

Oxygen release capability = 10%
Required chemicals = 960#

The manufacturer's information regarding oxygen release capabilities should be followed in calculating required chemicals. A factor of safety of 25% of the calculated volume of material required will be allowed.

Layout of Injection Wells

Determining the location and number of injection wells required for a one time application is a critical factor in the designing of in-situ bioremediation. The design considerations are based on a one-time injection of oxygen. Injection wells galleries should be located to provide distribution of the electron acceptor and nutrients throughout the area targeted for remediation. Amounts of material injected at each location should be based in the estimated contaminant levels to be remediated.

Determining the area of influence is a key parameter for proper distribution of the product into the ground. Injection pressure, hydraulic conductivity (K), hydraulic gradient (i) and porosity (n) are important elements to calculate an approximate area of influence. Darcy's law can be used to estimate the area of influence. The injection pressure used will drastically change the hydraulic gradient in the vicinity of the injection point. Assuming the length (Δl) is half of the radius of influence you should use the injection pressure (psi) and estimate of the radius of influence to determine if the amount of time to achieve this radius of influence makes sense. An example follows:

$v = K \Delta h/\Delta l$, where v = Darcy Velocity

$v_a = Ki/n$, where, v_a = Interstitial Velocity, (ft/sec)
K= Hydraulic Conductivity, (ft/sec)
i = Hydraulic Gradient, dh/dl (ft/ft)
n = Porosity of Aquifer Material, (%)

Generally, the products are injected into the ground with a pressure ranging from 250 to 2500 psi. To simplify the calculations, several assumptions are made to calculate the area of influence and interstitial velocity. Assuming a pressure of 1500 psi, an approximate area of influence 4 feet, and $K = 1 \times 10^{-4}$ cm/sec.

$v_a = Ki/n$
$= 3.28*10^{-6}$ ft/sec*3846
$= 0.0126$ ft/sec
$= 0.75$ ft/min

$K = 1*10^{-4}$ cm/sec $= 3.28*10^{-6}$ ft/sec
$\Delta h = (1500$ lb/in^2*144 in^2/ft^2)/(62.4 lb/ ft^3)$= 3462$ ft.
$\Delta l = 2$ ft. (half of the design influence)
$i = \Delta h/\Delta l = 3462$ ft/2 ft $= 1731$ ft/ft
n = 45% (assumed)
i/n = 1731/0.45= 3846

Based on the assumptions, it is revealed that 4 feet (0.75 ft/min. * 5 min. = 3.75 ≈ 4 feet) of radius of influence can be achieved in 5 minutes with an injection pressure of 1500 psi. You should then consider whether it is reasonable to expect the design pressure (psi) to be applied for the required time (5 minutes) at each injection point. You can decrease the time required by increasing the injection pressure and/or reducing the design radius of influence.

Location of the injection points should maximize the area of influence from each injection point (i.e., offset or staggered centers).

Monitoring

One round of groundwater samples should be collected and analyzed for all contaminants of concern and TPH and COD prior (within one month) to injection of oxygenating compounds. Six months after injection another round of groundwater sampling should be performed and results evaluated to determine the effectiveness of the oxygenating compound. This information should be compiled in a status report and submitted to the Agency

Closure

Sampling of the soil and groundwater should show compliance with the applicable 35 IAC Part 742 criteria.

Additional information may be obtained by calling 217/782-6762 and asking for the Leaking Underground Storage Tank Section Project Manager on call or by visiting the Illinois EPA's Web site at **www.epa.state.il.us**.

The Feasibility and Design for Bioremediation Fact Sheet is for general information only and is not intended to replace, interpret or modify laws, rules, or regulations.