FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

KOCH REFINING COMPANY
PROPOSED NEW LAND TREATMENT FACILITY
ROSEMOUNT, MINNESOTA

MARCH, 1988

Minnesota Pollution Control Agency

Minnesota Pollution Control Agency

May 26, 1988

TO INTERESTED PARTIES:

The final Supplemental Environmental Impact Statement for the Koch Refining Company's proposed land treatment facility located in the City of Rosemount was determined adequate by the Minnesota Pollution Control Agency Board on May 24, 1988. This action concludes the environmental process for the project. Permitting should proceed for the project within 90 days after the determination of adequacy. However, the 90 day period may be extended with the consent of the permit applicant or where a longer period is required by federal law or state statute.

Sincerely,

Clifford T. Anderson
Director
Office of Planning and Review

CTA:mfl

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KOCH REFINING COMPANY
PROPOSED NEW LAND TREATMENT FACILITY
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1.0

SUMMARY

1.1 PURPOSE AND FORMAT OF THE FINAL SEIS

The final supplemental environmental impact statement (SEIS) has been prepared in accordance with the Minnesota Environmental Quality Board (MEQB) rules, Minnesota Rules Part 4410.0300-4410.7800. The Minnesota Pollution Control Agency (MPCA), as the responsible governmental unit (RGU), has prepared responses to the timely, substantive comments on the draft SEIS consistent with the scoping decision for the project.

The purposes of the final SEIS are to:

- Provide technical information supplementing or revising the draft SEIS
- List potential impacts and commitments to mitigation measures for the proposed project
- Respond to draft SEIS and public hearing comments

The contents of this final SEIS are presented in the following order:

- Environmental Impacts and Mitigation Supplement
- Response to Draft SEIS comments

The final SEIS consists of this document plus the draft SEIS.

1.2 PROPOSED ACTION AND ALTERNATIVES STUDIED IN THE FINAL SEIS

This SEIS is required for construction of a new hazardous waste facility at the refinery. The existing land treatment facility was permitted under interim status rules and since more restrictive final rules have now been promulgated, the proposed project and its alternatives are being investigated as a means to achieve compliance. The proposed action has evolved since the SEIS process was initiated. At the initiation of the SEIS process the proposed action was represented best by Alternative 1 - Land Treatment at the New Unit (without waste minimization). The current version of Koch's proposed action is now quite similar to Alternative 2 -Land Treatment at the New Unit with Waste Minimization. Comments received on the draft SEIS have focused on the current version of Koch's land treatment plans (essentially Alternative 2) and one issue relating to Alternative

5 - On-Site Landfilling with Waste Minimization and Treatment. Thus, further assessment of Alternative 2 and Alternative 5 are the focus of this final SEIS.

It should be noted that the purpose of the SEIS is to identify and describe potential impacts by examining all seven alternatives including the proposed project in a comparative fashion so that pertinent environmental effects are presented to those who will ultimately define the project and make permitting decisions. It is not the purpose of the SEIS to design new facilities or to determine facility permit specifications.

In the particular case of establishing a land treatment facility like that in Alternative 2, great emphasis must be placed on the in situ testing conducted under the land treatment demonstration (LTD) project. Land treatment depends upon microbial degradation which is highly sensitive to many site-specific variables which by nature are exceedingly complex. For this reason careful LTD design including closely specified operating practices and effective monitoring and enforcement at the final operating land treatment facility are essential to the ultimate construction of a proper facility. Since reconstructed soils will be utilized in the permanent facility, the construction of the LTD soils must also be carefully designed, performed, and tested to document initial conditions. These aspects are emphasized in this final SEIS.

Summary descriptions of Alternatives 2 and 5 are presented below:

Alternative 2 - Land Treatment at the New Unit, with Waste Minimization

Alternative 2 consists of a new land treatment facility (landfarm) with waste minimization. This alternative is identical to Alternative 1, but with waste minimization techniques, which consist of waste dewatering prior to land treatment. The waste volume to be applied onto the land treatment facility would be reduced by centrifugation or mechanical dewatering prior to application to the landfarm. Approximately 50% of the water in the waste sludge would be removed in the dewatering process, leaving about 12,000 tons of waste per year to be applied to a 30-acre application area within the land treatment facility. A schematic of this facility is presented in Figure 2-2 of this document.

Alternative 5 - On-Site Landfilling with Waste Minimization and Treatment

Alternative 5 consists of an on-site landfill with waste minimization and treatment. Waste minimization

consists of waste dewatering and waste treatment consists of chemical fixation. The landfill site will be approximately 7 acres in size and will be located south of the existing landfarm. The facility will be constructed and operated in accordance with RCRA standards.

1.3 PERMITS/APPROVALS REQUIRED FOR THE PROJECT

Before construction or operation of Alternative 2 or 5, Koch Refining Company must apply for and receive the governmental permits, licenses, or approvals presented in Table 1-1.

1.4 ENVIRONMENTAL IMPACTS AND MITIGATION

This final SEIS supplements the draft SEIS analysis with technical information and mitigative measures, where appropriate, for the following topics:

Project Description
Groundwater Quality
Surface Water Quality
Air Quality and Odor
Closure

1.5 PUBLIC HEARING AND DRAFT SEIS COMMENTS

A public meeting to obtain comments on the adequacy of the draft SEIS was held in Rosemount on March 3, 1988. Written comments were also received during an official comment period following distribution of the draft SEIS, which ended on March 18, 1988. Section 3.0 of this final SEIS includes a summary of the comments received at the public meeting and Agency responses, and contains responses to letters of comment on the draft SEIS, and the letters received which didn't require responses.

Primary areas of concern as expressed in comments on the draft SEIS included the potential for groundwater contamination, air emissions, surface water pollution impacts, and existing landfarm closure land uses.

TABLE 1-1

PERMITS AND APPROVALS

Level of Government	Type of Permit	Status
State of Minnesota Minnesota Pollution Control Agency (MPCA) Division of Air Quality	Amendment to the Air Emission Facility Permit	To be applied for if deemed necessary
MPCA Division of Water Quality	Amendment to the refinery's existing national Pollution Discharge Elimination System (NPDES) permit No. MN0000418	In process
MPCA Division of Hazardous and Solid Waste and U.S. EPA	RCRA Part B hazardous waste permit for new land treatment facility or other hazardous waste disposal facilities	Permit is being developed by Koch concurrently with SEIS
City of Rosemount	Building permit for tanks and structures	To be applied for
Dakota County Department of Health Services	On-site treatment system permit	To be applied for

ENVIRONMENTAL IMPACTS AND MITIGATION SUPPLEMENT 2.0

CHAPTER 2.0

ENVIRONMENTAL IMPACTS AND MITIGATION SUPPLEMENT

This Environmental Impacts and Mitigation Supplement is a supplement to the draft SEIS prepared for the Koch Refining Company Proposed New Land Treatment Facility. It and the response to comments on the draft SEIS and the draft SEIS constitute the final SEIS for the project.

The supplement contains additional technical information about the proposed project, Alternative 2, including its construction and potential groundwater quality and closure impacts and mitigation measures. It also contains a description of Alternative 5, the on-site landfilling alternative, and it's potential for groundwater quality impacts.

2.1 PROPOSED PROJECT/ALTERNATIVE 2 - NEW LAND TREATMENT FACILITY, WITH WASTE MINIMIZATION

As mentioned previously in this final SEIS, the current version of Koch's proposed project has evolved from its original description represented in the draft SEIS analysis by Alternative 1 - Land Treatment at the New Unit. The most current proposal now most closely resembles Alternative 2 - Land Treatment at the New Unit, with Waste Minimization. Since the bulk of the comments on the draft SEIS have focused upon the land treatment project, as it is currently proposed, it is now appropriate to examine Alternative 2 in this discussion. Comparisons between Alternative 1 and known specifics about Koch's current version of its proposed project are compared and contrasted to Alternative 2 as analyzed. Qualitative or quantitative comparisons with Koch's current version are presented wherever possible.

2.1.1 DESCRIPTION OF ALTERNATIVE 2

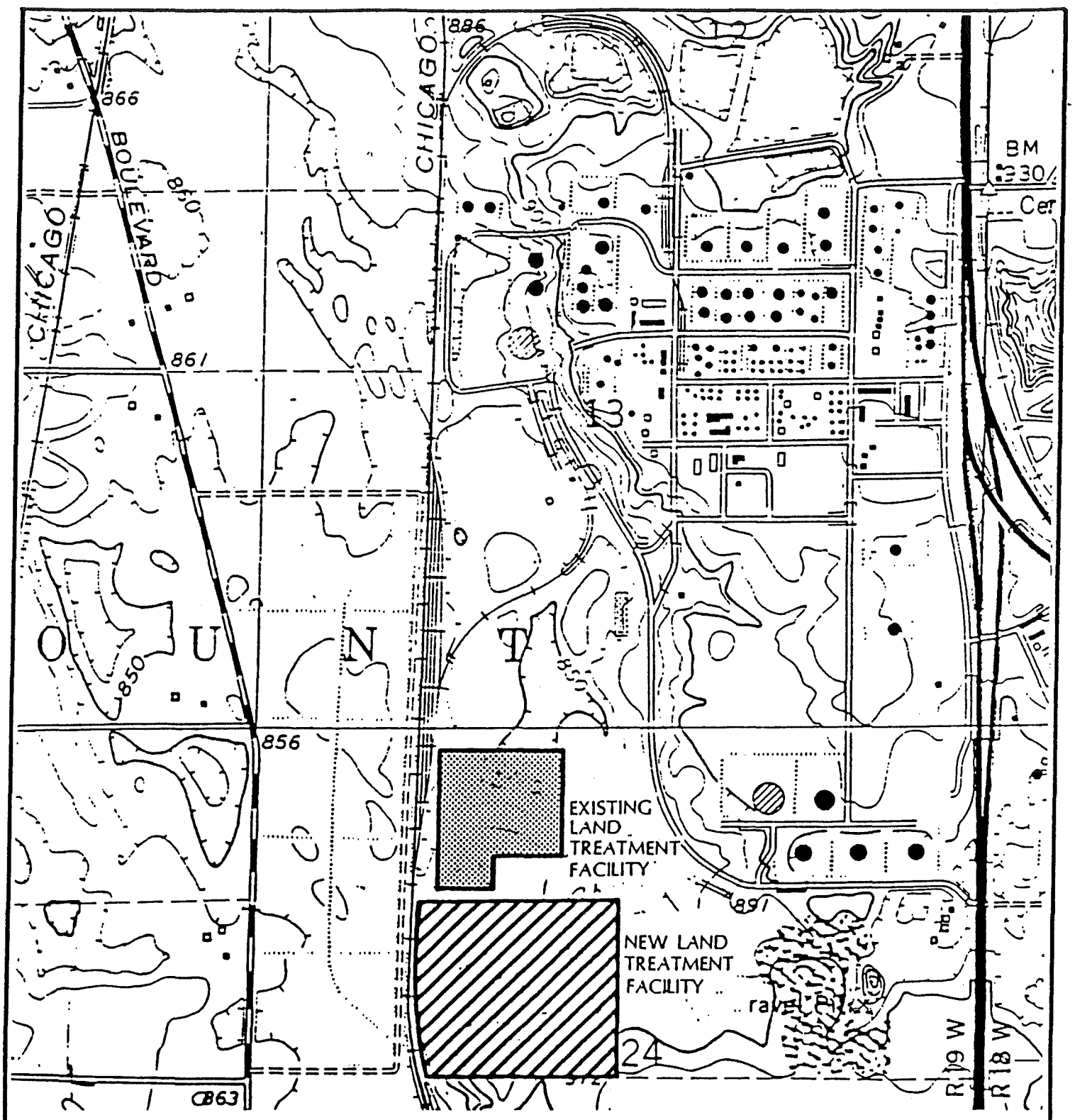
Construction and operation of a proposed new land treatment facility employing waste minimization techniques would enable Koch to treat, store and manage its wastes in an improved manner over methods currently used at their existing landfarm. Although no significant changes are foreseen by Koch regarding the type or characteristics of wastes generated by the refinery, waste minimization techniques would reduce the volume of wastes applied to the land treatment facility. Dewatering wastes will significantly reduce the hydraulic loading and thus lessen the chances for migration of chemicals from the treatment zone. Dewatering will also reduce the concentrations of volatile organics and water soluble chemicals increasing the effectiveness of the facility. Treatment on-site would reduce the opportunities and liabilities associated with unintentional

spills caused when transporting the wastes to off-site treatment/disposal sites.

The facility design and layout for this alternative is identical to that of Alternative 1. (It is presented in detail in the draft SEIS). The only difference from Alternative 1 is the addition of dewatering process equipment which will consist of either a centrifuge or other dewatering equipment.

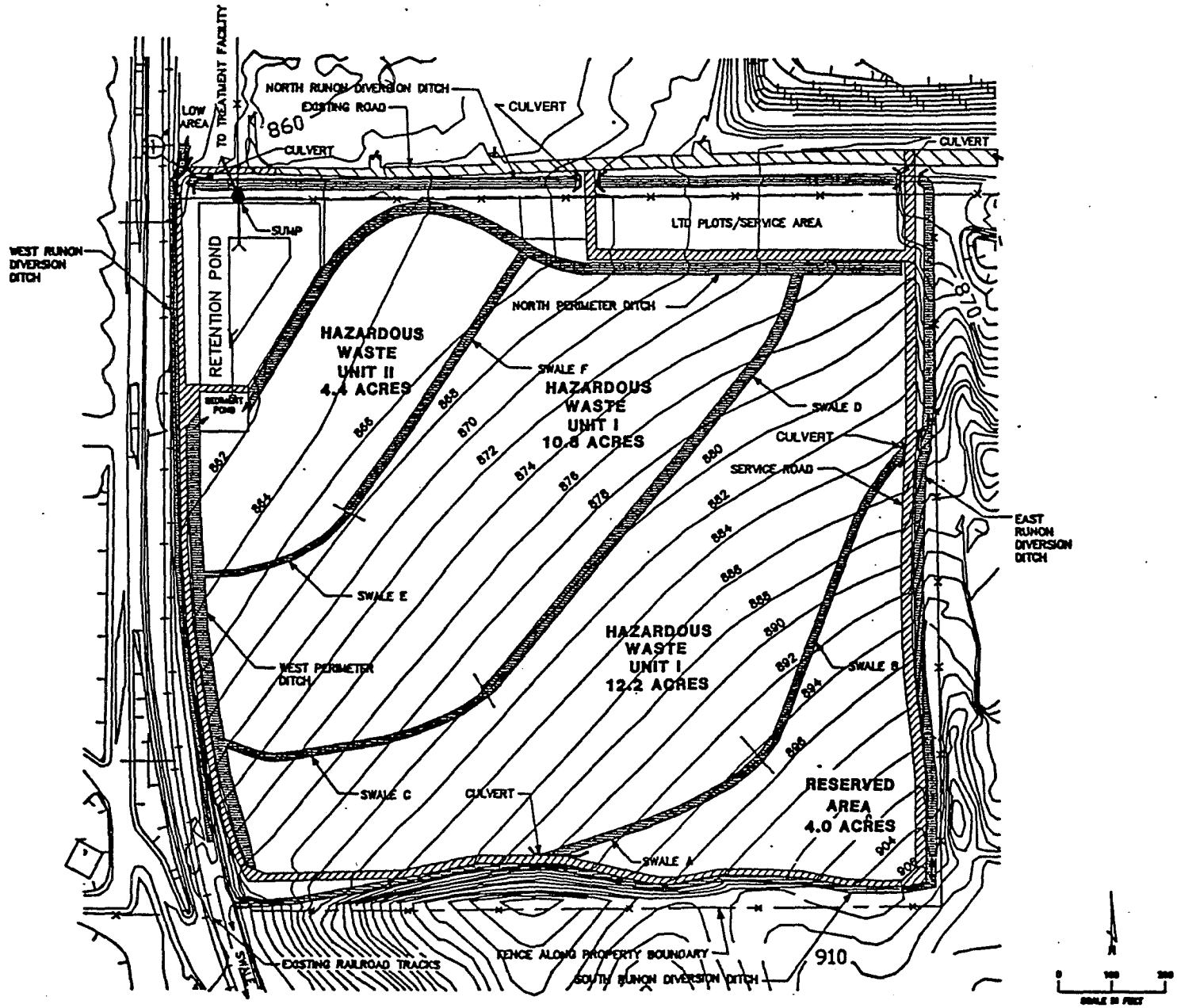
The current proposal for the new land treatment facility would be located on an approximately 42 to 43 acre area south of the existing facility as shown on Figure 2-1. Figure 2-2 presents the generalized construction diagram for the most current version of the proposed land treatment facility. The facility would consist of two units, Hazardous Waste Units I and II (HWI and HWII) with a total combined acreage of 27.4 acres. Unit I, in the most current version, would have two cells with a total active area of about 23 acres. Unit I, as analyzed, in the draft SEIS, contained two cells with a total active area of about 25 acres. Unit II in the most current version, would have an active application area of 4.4 acres. Unit II, as analyzed in the draft SEIS, contained five acres comprised of one individual cell. (Additional acreage for buffer zones, roads, ditches, runoff control ponds, reserved area, and area for land treatment demonstration plots bring the total to 42-43 acres.) It should be noted, however, that the specific size of the new land treatment facility is contingent upon completion of the land treatment demonstration (LTD). Hazardous waste unit I will receive the majority of the hazardous wastes and the high oil content wastes. Hazardous waste unit II will receive the high solids content wastes and low volume hazardous wastes.

Preparation of the land treatment site will require significant earthwork and soil reconstruction to bring topographic conditions into a form that will be suitable for use. The existing topography and soils of the new land treatment facility site are shown in Figures 2-3 and 2-4. Essentially, the site is divided diagonally northeast-southwest by a 10 to 15 percent slope which drains to the north. The slope and the hilltop to the southeast will be graded as shown in Figure 2.2-2 from the draft SEIS (included here as Figure 2-2). Approximately 17 acres including at least 12 acres of hazardous waste unit 1 would require soil restructuring. Specifications for the reconstructed soils will include criteria such as: sieve size of soil, depth of soil layers, gradation, soil pH, cation exchange capacity and organic content. Earthen dikes would be constructed to aid in cell management. Dikes constructed around the facility would prevent run-on from surrounding land to minimize water treatment and erosion. Internal dikes would be used to manage individual cells. Proposed construction specifications are presented in Table 2.3-1 of Appendix AA: Design, Construction, Operation, and Maintenance Report for the New Land Treatment Facility, January



SOURCE: CONCEPTUAL CLOSURE PLAN-NEW HAZARDOUS WASTE LAND TREATMENT FACILITY, BARR ENGINEERING CO., OCTOBER 1, 1987.

KRC NEW LAND TREATMENT FACILITY SEIS		MAR. 1988
LOCATION OF LAND TREATMENT UNITS		2-1

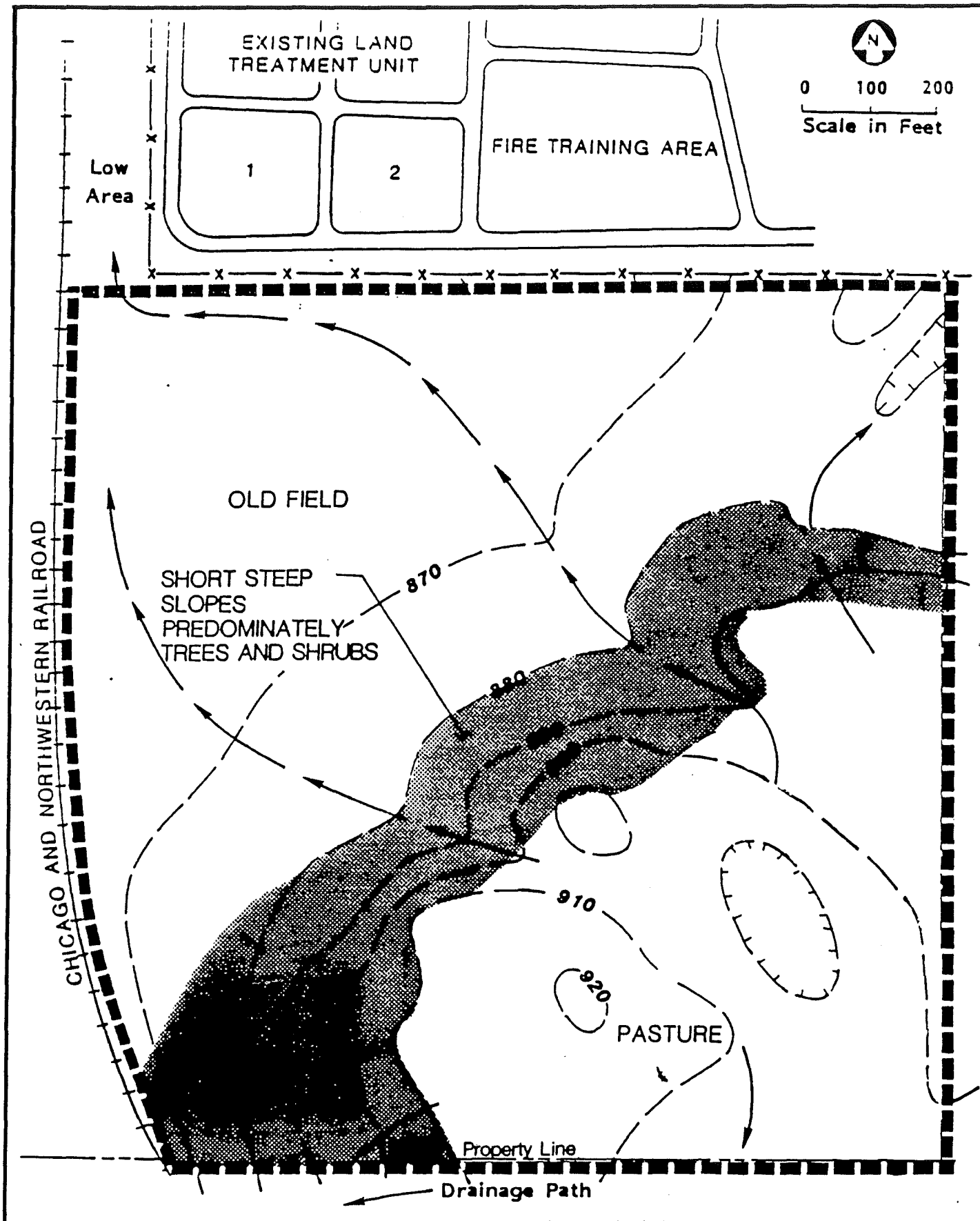


KRC NEW LAND TREATMENT FACILITY SEIS

MAR. 1988

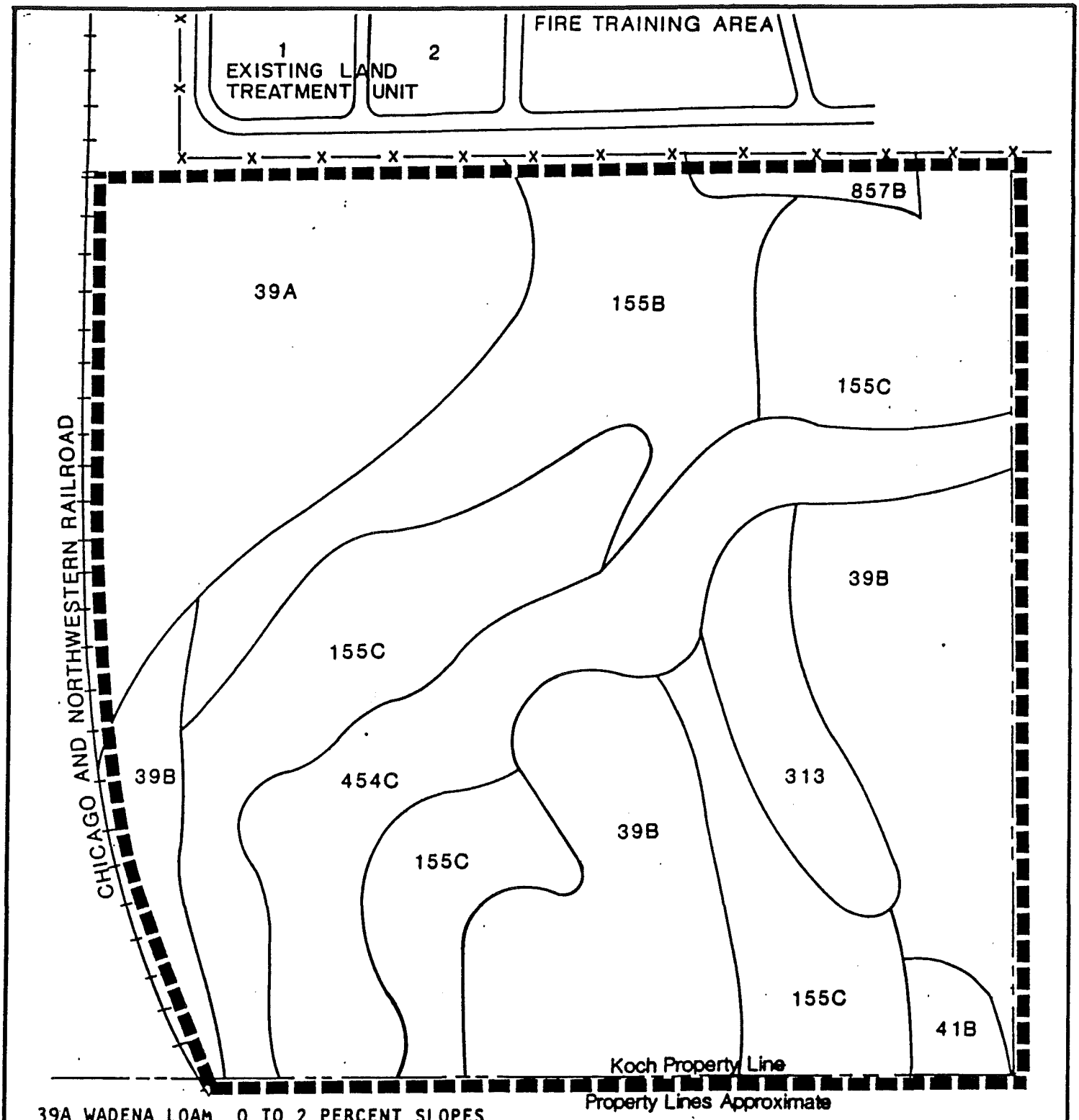
SCHEMATIC OF NEW LAND TREATMENT FACILITY

2-2



Source: Developed From U.S.G.S. Inver Grove Heights 7.5 Minute Quad Map (Property Lines Approximate)

KRC NEW LAND TREATMENT FACILITY SEIS		MAR. 1988
TOPOGRAPHY & LAND USE AT FACILITY SITE		2-3



39A WADENA LOAM, 0 TO 2 PERCENT SLOPES
39B WADENA LOAM, 2 TO 6 PERCENT SLOPES
41B ESTHERVILLE SANDY LOAM, 2 TO 6 PERCENT SLOPES
155B CHETEK SANDY LOAM, 3 TO 8 PERCENT SLOPES
155C CHETEK SANDY LOAM, 8 TO 15 PERCENT SLOPES
313 SPILLVILLE LOAM, OCCASIONALLY FLOODED
454C MAHTOMEDI LOAMY SAND, 8 TO 15 PERCENT SLOPES
857B URBAN LAND-WAUKEGAN COMPLEX, 1 TO 8 PERCENT SLOPES

N

0 100 200
Scale in Feet

(ADAPTED FROM: USDA SOIL CONSERVATION SERVICE

KRC NEW LAND TREATMENT FACILITY SEIS		MAR. 1988
DAKOTA COUNTY SOIL MAP IN VICINITY OF PROPOSED KRC LAND		2-4

1988. This report is on file at the MPCA.

The proposed new facility would be constructed so as to effectively collect and treat runoff from the cells. The water would drain to a stormwater collection pond via drainage ditch. This pond would be located within the site in either the northeast or northwest corner of the new land treatment facility and would be of adequate size to hold a 100-year, 24-hour storm event. The pond would be about three acres in size with a maximum depth capacity of nine feet. Water collected in the stormwater collection pond would then be conveyed to the refinery's wastewater treatment plant within a seven day time period where it would become incorporated with the refinery's normal wastewater flow. Discharge from the wastewater treatment plant is to the Mississippi River under the National Pollutant Discharge Elimination System (NPDES) permit.

2.1.1(a) Description of Wastes

The hazardous wastes that would be applied to the proposed land treatment facility are the same as those currently being handled by the existing facility and as described for the proposed project (see draft SEIS pages 2-13 to 2-19). However, the quantity of waste disposed would be reduced through waste minimization techniques.

2.1.1(b) Waste Minimization

Dewatering

Waste minimization techniques for this alternative would consist of physical dewatering using either centrifugation equipment or another type of mechanical dewatering device. The approximate weight of the wastes to be dewatered annually is 18,000 tons. A typical waste would experience a 50 percent reduction in water content during the dewatering process based upon data from dewatering equipment vendors. About 5.44 E09 cc (5.4 billion cubic centimeters) or 192,500 cu.ft. of water would be removed during the process. The volume of waste after dewatering has been calculated as 9.56 E09 cc or 337,600 cu.ft. This volume of dewatered waste has a calculated mass of approximately 12,000 tons. As part of the dewatering process, the quantity of soluble salts such as sodium and chloride, and volatile organics in the wastes would also be reduced, which would result in the application of reduced amounts of these waste constituents to the land farm.

DAF float and other hazardous wastes would be stored as liquid sludges, and dewatering would occur just prior to transportation to the land treatment facility and land spreading. Supernatant water would be returned to the head end of the wastewater treatment plant (WWTP), prior to the API separator.

Other waste minimization methods were also considered for inclusion with this alternative. These methods included: recycling of DAF float, phase separation, solvent extraction and chemical fixation. None of these methods are currently proved to be technically practicable.

2.1.1(c) Changes in Solid Waste Management Practices

The changes in solid waste management practices would be the same as those described for Alternative 1 in the draft SEIS. For those waste streams which are now managed at the existing landfarm and which are designated as low oil content non-hazardous solid waste, a new solid waste land treatment facility would be constructed on the Koch property and would be permitted and operated under a separate Minnesota Solid waste and/or NPDES permit not subject to Federal hazardous waste rules.

2.1.1(d) Proposed Operating Practices

The proposed hazardous waste land treatment facility must be operated as demonstrated by a successful land treatment demonstration. Hazardous wastes would be handled and stored as liquid sludges until the time for transportation. Just prior to loading, wastes would be dewatered creating sludge. The sludge would be loaded into covered trucks, transported to the two hazardous waste land treatment units, and applied to the land using a manure spreader or similar equipment.

A comparison of operating conditions for Alternative 2 as analyzed in the draft SEIS and the most current version of Koch's proposed project is presented in Table 2-1 below.

TABLE 2-1

OPERATING CONDITION COMPARISONS

	DRAFT SEIS ALTERNATIVE 2 ANALYSIS CONDITIONS	CURRENT VERSION OF KOCH'S PROP. PROJ.
Treatment Area	30.0 acres	27.4 acres
Treatment Season	214 days April 1-October 31	Undetermined
Waste Applications Per Season	1	HW I 3/HW II 1
Treatment Soil Type	Wadena Loam	Reconstructed According to Specifications Based on Wadena Loam
Method of Incorporation	Chisel plow	Moldboard plow followed by chisel plow
Dewatering Technique	Belt or filter press	Centrifuge or other mechnical dewatering equipment

2.1.1(e) Proposed Pollution Control Measures

Pollution control measures would be identical to those of Alternative 1, except that additional monitoring on a monthly basis would likely be required for supernatant water returned to the wastewater treatment facility. This monitoring would include general chemistry parameters (pH, conductivity, oil and grease, etc.),, selected metals, and selected organics. Once a year, the supernatant water would be analyzed for the entire "Skinner list" of hazardous constituents.

2.1.1.(f) Transportation, Handling and Storage of Waste

This alternative would change the transportation, handling and application of the wastes at the land treatment area. Under current operations and Alternative 1, wastes are stored, handled, transported and applied as liquid sludges, with water content ranging from 50 to 70 percent (for DAF float, the largest volume

waste). Dewatering would result in a filter cake sludge (moisture content 25 to 35 percent); hence, transportation would need to be by dump or gondola truck instead of vacuum trucks. Application of the wastes to the land treatment areas would likely be by manure spreader or similar equipment, instead of spray from the vacuum trucks.

2.1.1(g) Impacted Support Facilities

The WWTP will not be significantly impacted by receiving supernatant water from dewatering for the proposed project. The amount of supernatant water sent to the WWTP is estimated to be only 5,000 to 10,000 gallons per day, with BOD/COD, oil and grease and other parameters similar to incoming wastewater. The design flow for the expanded WWTP is 4.3 MGD. It would not be expected that the WWTP would need to be expanded further to handle the increased amount of supernatant water. The impacts to the WWTP are discussed in more detail in the surface water quality section of the draft SEIS.

2.1.2 GROUNDWATER QUALITY

Groundwater quality has been one of the areas of greatest concern throughout this SEIS process. This discussion presents supplemental information regarding the analyses.

2.1.2(a) Impact Assessment

2.1.2(a)(i) Hazardous Waste Constituents of Concern

The selection of hazardous waste constituents of concern is addressed in detail in 3.1.1(a)(i) of subsection 3.1 of the draft SEIS. A subset of chemicals potentially released from each on-site source was selected primarily on their potential concern to human health, but also on their chemical/physical properties. These chemicals are listed below:

Inorganics:
- Sodium
- Chloride
- Arsenic

Metals:
- Cadmium
- Chromium (hexavalent)
- Mercury (inorganic)
- Nickel
- Lead

Volatile Organics:
- Benzene
- Toluene
- Xylene (sum of m-xylene, o-xylene, and p-xylene)

Carcinogenic Polyaromatic Hydrocarbons:
- Benzo[a]pyrene

In response to comments two additional chemicals were evaluated, phenol and methyl-ethyl ketone (MEK). These chemicals have been identified as also having characteristics giving them one of the highest potentials for exhibiting a combination of transport and persistence in the landfarm though they have much lower health risk associated with them.

The chemicals selected for analysis fulfill the purpose of the SEIS by providing information about those chemicals with the greatest potential for environmental impacts and allow uniform comparison across all alternatives. Other chemicals may be of concern with respect to the strictest interpretation of the regulatory aspects of permitting the facility, because under Minnesota Rules 7045.0536, land treatment, all hazardous constituents placed in or on the treatment zone must be degraded, transformed into non-hazardous forms or immobilized within the treatment zone. It is standard procedure for all chemicals of concern and related impacts to be addressed during the permitting process.

2.1.2(a)(ii) Groundwater Impact Analysis

Estimates of the quantity and quality of leachate and related impacts for Alternative 2 are presented in section 3.2.1(a)(ii) of the draft SEIS. Predicted impacts, indicated an increase in sodium, chloride, and thus TDS. Only the TDS level was predicted to exceed an RAL or secondary standard. VOC's including phenols and MEK remained at below detectable concentrations. B[a]P concentrations in the groundwater were calculated to be less than the detection limit of 10 ug/L. Standard equations and conservative coefficients were utilized. This discussion further explains the analysis and clarifies important issues relating to the proposed facility.

Leachate Quality

Organics

The organic chemical soil concentrations used to determine leachate quality in the draft SEIS were considerably greater than those calculated to be achieved during the life of the facility. This is true whether a 214-day treatment schedule is used with a three day application cycle or whether a 150-day treatment schedule is used with a 50-day treatment cycle (see section 3.3, responses 2 and 7). The water balance conservatively assumed that zero runoff would occur during the active land disposal period (April - October). Only the top foot of the 5 foot treatment zone was assumed to provide treatment.

The fate of constituent soil concentrations of key organic compounds calculated solely as a function of biodegradation are presented in Table 2-2. Volatilization effects were not considered in these calculations. The inclusion of volatilization would significantly lessen the time required to reduce the concentration of volatile constituents to background or below detectable levels, thereby adding a considerable safety margin.

TABLE 2-2
ORGANIC CHEMICAL FATE - ALTERNATIVE 2

	Initial Soil Concentration C_o (mg/kg)	Ct (mg/kg)	k(a)	t_d Degradation Time (b) (days)	kp(a)	t_m Migration Time(c) (days)	$\frac{t_m}{t_d}$
Benzene	7.1	0.5	0.1	26.5	2.49	83.5	3.2
Phenol	0.89	0.5	0.69	0.8	6.50	218.	272.
MEK	23.8	0.5	0.69	5.6	1.67	55.9	10.0
B[a]P	27.4	10.	0.008	213	1.35×10^5	4.5×10^6	2.1×10^4

(a) Tne values in the literature ranged approximately one order of magnitude. The conservative value was used to provide a more conservative estimate.

(b) Time to reach non-detectable level.

(c) Time to travel from the first foot (30 cm) of the treatment zone. These migration times are notably conservative because of the related infiltration assumptions in the water balance.

Results of the calculations regarding organic chemical fate under revised conditions are presented in Table 2-3.

TABLE 2-3
ORGANIC CHEMICAL FATE - REVISED CONDITIONS

	Initial Soil Concentration C_o (mg/kg)	Ct (mg/kg)	k	t_d Degradation Time (days)	kp	t_m Migration Time tm	$\frac{t_m}{t_d}$
Benzene	3.47	0.5	0.1	19.4	2.49	55.7	2.9
Phenol	0.45	0.5	0.69	<0.1	6.50	6.7	134.
MEK	1.18	0.5	0.69	1.2	1.67	37.1	30.9
B[a]P	13.6	10.	0.008	38.4	1.35×10^5	3.0×10^6	7.8×10^4

The equations utilized in this analysis shown below are as presented in the API publication no. 4379, (1984) The Land Treatability of Appendix VIII Constituents Present in Petroleum Industry Wastes, t_d and t_m can be estimated as shown below.

$$t_d = \frac{\ln(c_t/c_o)}{-k}$$

where:

c_o = the concentration of a constituent in the soil (mg compound/kg soil) at time 0 (immediately after waste application and incorporation).

c_t = the detection limit concentration of the constituent in the soil at time t (mg compound/kg soil) based on EPA analyses techniques.

k = first order kinetic constant (day^{-1})

t_d = time to degrade constituent to a concentration c_t (days)

$$t_m = \frac{z}{v\ (1 + (\rho/n)(k_p)}$$

where:

z = depth of biologically active treatment zone (cm)

V = velocity of water (cm/day)

ρ/n = bulk density of soil/porosity of soil (g/cm^3)

K_p = soil water partition coefficient (ml/g)

No impacts from seepage of adsorbed chelated or suspended chemical forms is anticipated. The inverse dispersion relation between mass and size indicated the rate of transport of these phases is much slower than the dissolved phase and the migration time for the dissolved phase is sufficient to degrade its chemical load (see response to comment 29 in section 3.3 of the final SEIS).

Metals

The nature of the soil micro-chemistry involving metals is complex. The coordination chemistry taking place in micro-

environments and the multi-variable conditions which affect these reactions indicate that the best practicable approach is to monitor in situ for metals leaving the treatment zone rather than studying the micro-environment. The MPCA evaluations of groundwater and soil pore water for the existing site do not indicate that metals have migrated from the site (see section 3.3 response to comment 9). Through the implementation of good operational activities it was assumed that conditions favorable to binding metals could be maintained in the new facility. The establishment of proper site-specific operation practices and their implementation is vital to the success of the future facility as highlighted in the mitigation portion of this discussion.

Biodegradation

The calculations utilizing published biodegradation rates indicate that the proposed facility should be capable of reducing the analyzed waste concentrations before they migrate from the treatment zone. However, the biodegradation that occurs during land treatment is dependent upon a great number of variable in situ conditions including the variation among and within the organisms themselves. Temperature, moisture, oxygen supplies, concentrations of chemicals including nutrients, toxins and metabolic products of other types of bacteria all can influence the rate of biodegradation.

As with metals, the accurate monitoring of related micro-processes is very difficult outside of the laboratory. Indirect monitoring of related conditions is the major means of measuring the rate of biodegradation. This emphasizes the importance of careful design, operation and monitoring of the land treatment demonstration project.

A soil temperature of at least 10°C (50°F) is required within the zone of incorporation prior to waste application for the effective treatment of wastes. Available climatologic data based on less than 10 years of information indicate that the yearly period for temperatures of 10°C or greater at depths of at least 8 inches under bare ground extends from the beginning of the third week in April to the end of October, approximately 192 days. This period will naturally vary from year to year and does not reflect in situ conditions. Soil temperature must be a component of the operating plan for the new land treatment facility.

Soils

The soil structure and chemical composition of the reconstructed soil at the new land treatment facility will have a critical role in determining the success of the proposed facility. The soil structure determines water percolation rates, and provides carbon

1 con't If the Agency chooses not to require an additional supplemental EIS, and during the course of the demonstration project Koch is required to make several major revisions of their intended application rates, operating methods, etc., what review method will the Agency use to ensure proper, safe operation of the new land treatment facility? County staff feel an additional supplemental EIS would be a vehicle that the Agency and area residents could use to allow a proper review of the information.

The final supplemental environmental impact statement will, in the estimation of Public Health staff, require the following additions to the draft;

1a 1. Significant modification and revision of the draft SEIS needs to be undertaken in the areas of groundwater quality and leachate generation, the construction and operation of the land treatment facility including the size of the landfarm cells and proposed loading rates, and air quality modelling.

1b 2. Koch Refining Company staff have proposed a project which differs significantly from those described in the draft SEIS. The final SEIS should address their proposal.

1c 3. The additional SEIS mentioned above should be incorporated into the final SEIS.

Staff of Dakota County look forward to working with MPCA staff and officials of Koch Refining Company on this and other matters.

Our comments on the proposed project and its alternatives follow this letter.

Sincerely,

George Kinney
Lead Worker/Hazardous
Waste Management (450-2793)

Ronald Spong
Lead Worker/Water
Quality Management (450-2607)

cc: Donna M. Anderson, Public Health Director
Mike Hansel, Koch Refining Co.

COMMENTS

A. Hazardous Waste Rules Requirements

2 MN Rule 7045.0536 Subp. 2.A. states that all hazardous constituents applied to a landfarm must be degraded, transformed, or immobilized within the treatment zone which Koch claims as 60 inches. This has not been shown in the draft SEIS. The draft SEIS reduced 37 organics and metals found in Koch's hazardous waste to 10 indicator parameters on the basis of human health risk, not movement in the environment as required by Minnesota Rules, and did not consider any intermediate chemicals formed from the waste during degradation. Since all hazardous constituents must be shown to be degraded, transformed or immobilized, the reduction to 10 indicators is improper. In addition the final SEIS should define how volatilization from the landfarm is a form of treatment.

B. Scoping Document Requirements

3 The final scoping decision document, passed by the MPCA Citizen Board on August 25, 1987, requires several items to be included, "if available", in the draft SEIS. These include the results of the laboratory treatability studies which have recently been made available but were not in the draft SEIS, a computer simulation for constituent mobility which was not included in the draft SEIS, performance data from the existing land treatment farm including groundwater and unsaturated zone monitoring (inadequately addressed in the draft SEIS), the field demonstration study (which staff understands will not begin until the winter of 1988-1989), and the new land treatment farm design which, although addressed, is incomplete because of sizing, changes in soils to which waste will be applied, and inadequate discussion of operating practices. Required information under the facility layout section include a discussion of hydraulic loading, waste application rates, stabilized oil concentrations and target nutrient levels. All of this information needs to be addressed in the final SEIS.

4 Dakota County staff commented, during the scoping process, that the proposed land treatment facility's location updgradient of the present landfarm will necessitate a well-designed, complex monitoring system for unsaturated and saturated zone monitoring. This system will need to be capable of distinguishing the movement of hazardous constituents from the proposed landfarm as opposed to the existing landfarm. MPCA response to this comment was that it would be addressed during permitting. We feel this comment is still valid, and, under the scoping outline I.D.2.b.(2)(e) "Proposed...unsaturated zone monitoring and groundwater monitoring", is appropriate to be discussed in this document. As staff have verbally transmitted to the MPCA staff, it is possible that monitoring well 8 is not truly an upgradient well and placement of future wells should take into account the lateral spread of landfarm constituents through the 60-90 feet of unsaturated outwash.

C. Land Treatment Farm Temperature

5 The laboratory treatability study recently completed used natural Wadena loam (which will not be the soil of the proposed LTF) at laboratory temperatures (usually 20 degrees Celsius). No temperature variation was performed, although soil temperature is very important to microbial activity. A review of literature indicates very little appreciable biodegradation occurs below 15 degrees Celsius (59 degrees Fahrenheit), which will not be reached in Waukegan loam until at at least mid-May (Hydrologic Characterization Report), not April 1 as stated in the draft SEIS.

D. Groundwater Quality Analysis

6 The groundwater quality analysis is totally inadequate. The draft SEIS does not address the hazardous constituents of concern, but only those "indicator chemicals" chosen by availability of toxicity values in the literature. Under Minnesota Rules, all hazardous constituents must be degraded, transformed or immobilized within the treatment zone, not just those proven to be carcinogenic or highly toxic. Several volatiles and semivolatiles present in Koch waste are water soluble, but all four chosen organic "indicator chemicals" are insoluble. The subsequent analysis of leachate quality, technical work paper 1, Appendix D, is also inadequate.

7 The statement has been made that Appendix D, Leachate Quality, is a worst case scenario because the total annual loading is placed on the landfarm at one time (April first). The waste is then given the entire treatment season to degrade with no additional loading which is not "worst case." Appendix I on the other hand, assumes waste is applied to the landfarm every other day, which is more realistic. Waste applied late in the season will not totally degrade. The analysis in Appendix D is lacking elementary soil chemistry, partition coefficients, coordination chemistry corrections for soil temperature (the current equation assumes 77 degrees Fahrenheit, hardly soil temperature on April 1), and any partitioning between oily waste and

8 water (DAF float is 11% oil). The current equations are derived from a study of volatile organic chemicals present in drinking water, which is not applicable to oily waste deposited on soils. Many of the missing partition coefficents are present in the Appendix I (work paper 1) "Volatilization Modeling " and in the Auxiliary Reports prepared by Barr Engineering. Additional, specific comments will be made in the attached document.

9 Appendix C of the Closure Plan for the Existing Hazardous Waste Facility lists a number of metals present in monitoring wells W4 to W8 which are above the groundwater protection standard as given in MN Rule 7045. 0484 Subpart 7. The metals of concern are barium, cadmium, mercury, and selenium. The draft supplemental environmental impact statement states that the proposed landfarm, kept aerobic and near

9 con't neutral conditions, will have no problems with movement of metals as they shall "remain insoluble and adsorb to the soil matrix." This scenario has obviously not taken place in the existing landfarm. Additionally, if the metals do adsorb to cation exchange sites, a great number of these available sites will not be oil-covered soil particles but rather humic acid and other soluble and suspended organics. These will migrate downward out of the treatment zone.

10 With high total dissolved solids, which will be present in the proposed facility (and in Alternative 2), a slight reduction in aerobic conditions may cause a shift to a highly reducing atmosphere, even with a nearly stable pH. Under reducing conditions, metals will solublize quite readily. A review of the literature finds aerobic conditions are extremely difficult to maintain below 15 cm (maximum 20 cm) or 6-8 inches. All work in the draft SEIS used 12 inches for the zone of incorporation, which may mean the lower portion of the zone of incorporation will become anaerobic with reducing conditions and dissolved metals.

E. Inappropriate Sources

11 Throughout the draft SEIS, many of the references are cited as "Personal Communication" or in-house reports by the consulting firm. Many assumptions are based on data received in this manner. It is nearly impossible for an independent reviewer to adequately review an make pertinent comments on analyses relying on unpublished material.

12 It would be preferable to have all data and assumptions subjected to rigorous peer review in journals. For example, much of the leachate quality study done in the SEIS is based on an ICF Clement paper entitled "Inhalation Exposures to Volatile Organic Contaminants in th Shower." Dakota County staff have recently reviewed this paper, which has not been subjected to peer review, and found the study bear little, if any, relevancy to the proposed project, while other published work on land treatment farms does exist.

F. Construction of Land Treatment Farm

13 The proposed land treatment farm is shown in the draft SEIS as a gently contoured 40 acres drained by swales which separate the cells. Elevations across the proposed schematic range from 862 feet to 906 feet. The existing topography of the site shows several hills and three or four closed depressions, with elevations from below 860 to above 920 feet. No mention is made in the draft SEIS or attached wor papers of the obvious soils removal and recontouring which must take place. Throughout the draft SEIS and work papers, "natural Wadena Loam" is listed as the soil on the proposed site. The soil will not be natural, as the soil structure must be remanufactured after

approximate weight of waste to be dewatered annually is 18,000 tons. A typical waste would experience a 50 percent reduction in water content during the dewatering process based upon data from dewatering equipment vendors. About 5.44 x 109 cm^3 or 192,400 ft^3 of water would be removed during this process. The volume of water after dewatering has been calculated as 9.56 x 10^9 cm^3 or 337,600 ft^3. This volume of dewatered waste has a calculated mass of approximately 10,886,400 kilograms or about 12,000 tons.

As part of the dewatering process, the quantity of soluble salts such as sodium and chloride and volatile organics in the wastes would also be reduced.

DAF float and other hazardous wastes would be stored as liquid sludges, and dewatering would occur prior to transportation to the land disposal facility. Supernatant water would be returned to the head end of the wastewater treatment plant (WWTP), prior to the API separator. Alternatively, supernatant water could be returned to the shot pond and slowly fed back to the API separator.

2.2.1(c)(ii) Drying

In some cases, the wastes may need to be further dried after dewatering. However, for this Alternative it was assumed that further drying is not necessary because the wastes would be pretreated by chemical fixation process. The chemical fixation process requires moisture to be present in the waste in order for the process to be implemented.

2.2.1(c)(iii) Chemical Fixation

The wastes would be chemically fixed after dewatering. The purpose of this pretreatment technique is to stabilize hazardous components of the waste to minimize environmental impacts as a result of disposal. Chemical fixation is a patented process of a series of chemical reactions with a variety of compounds such as kiln dust, portland cement, lime, silicates, fly ash, or in combination, with the generated wastes. This process forms a chemically stable solid that physically adsorbs metal compounds of the waste; thereby, completing immobilization of such compounds.

2.2.1(d) Impacted Support Facilities

The WWTP may be impacted by receiving supernatant water from dewatering and landfill leachate. The amount of supernatant water and leachate sent to the WWTP is estimated to be ultimately minor volumes with similar levels of parameters of incoming process wastewater.

2.2.2 Groundwater Quality

2.2.2(a) Impact Assessment

2.2.2(a)(i) Leachate Generation

The leachate collection and liner system as proposed (draft SEIS, Section 3.4.1(a)(ii), page 3-118) indicates that xylene and toluene would leak from the liner system. The predicted leachate leakage from the landfill is not the result of improper design criteria; but rather, is due to limits in the capabilities of the model used to perform the liner leakage analysis and the conservative nature of the evaluation.

The hydraulic performance of the landfill leachate collection and liner system was evaluated using a model developed by Wong (1977) and modified by Kmet, et al. (updated). The equations of the model are presented on pages 3-118 through 3-121 of the draft SEIS. The use of this model was discussed and approved by the MPCA staff. The model takes into account many variables including liner thickness, hydraulic conductivity of the liner, and the height of the saturated volume on top of the liner (head). The model assumes that given a slug of liquid placed upon a liner, a portion of the liquid will drain off (be collected and the remaining portion will pass through the liner. Hence, the principal output of the model is the percent leakage through a liner for a given head.

As currently developed, and assuming all other variables are held constant, then when the head is decreased, the model predicts that the percent leakage through the liner increases. As illustrated in Appendix C, Item H of the draft SEIS.

Thus, even with a properly designed leachate collection and liner system, it is possible for the model to predict leakage. This problem was discussed with the MPCA staff to determine if the model was adequate for the purposes of the SEIS. It was determined that a better model was not known to exist, and since the model predicts a greater leakage than what might actually occur, it was decided that the model was suitable for the purposes of predicting worst case leakage conditions for the landfill.

In conclusion, the apparent leakage predicted for the landfill is the result of limits in the model utilized for the liner leakage analysis. The leachate collection and liner system as proposed are in full compliance with the regulations and guidelines for a hazardous waste landfill as set forth in CFR 264.301 and Minnesota Rules 7045.0538, subpart 3. Therefore, additional study of the landfill design is not warranted for the final SEIS.

RESPONSES TO DRAFT SEIS COMMENTS 3.0

CHAPTER 3.0

RESPONSES TO DRAFT SEIS COMMENTS

3.1 SUMMARY OF PUBLIC MEETING COMMENTS AND RESPONSES

A public meeting was held regarding the adequacy of the draft SEIS in the Rosemount Council Chambers on March 3, 1988. The comments from the transcript of the meeting were summarized and organized under the general areas of concern listed below. Responses to the comments are presented on the following pages and are numbered to correspond to the comment numbers.

	TRANSCRIPT COMMENT	COMMENTER	TRANSCRIPT PAGE NOS.
GROUNDWATER QUALITY			
Draft SEIS Section 3.1.1			
1.	Is the present landfarm working to the Agency's expectations? Is it exceeding the waste migration requirements?	Davis	66-67
2.	EPA says that all ponds, all landfills leak. Are the present ponds on the refinery site properly holding waste materials? Are ponds that hold waste materials and dewatered material allowed by permit to seep a certain amount?	Davis	69
3.	No amount of leachate is appropriate in the groundwater.	Pollock	79
4.	There is no statement in DSEIS on the possible synergistic effects of chemicals.	Miles	87

	TRANSCRIPT COMMENT	COMMENTER	TRANSCRIPT PAGE NOS.
5.	Ten years is not a sufficient time for monitoring the potential for contamination of groundwater due to the existing landfarm and the potential for contamination of soil at the 5 foot level.	O'Boyle	98
6.	What type of leachate testing of metals has been done for the landfarm soils and what were the results?	Davis	111-113
7.	Koch needs a third party to handle their waste. (The commenter does not believe that heavy metals will stay in the landfarm soil.)	French	119

AIR QUALITY

DSEIS Section 3.1.3

	TRANSCRIPT COMMENT	COMMENTER	TRANSCRIPT PAGE NOS.
8.	There is no statement on enforcement by the MPCA in the DSEIS for controlling emissions from the new landfarm. New regulations for chemicals not now regulated in the landfarm are needed. Commenter would like to see stricter regulations.	Miles	88

CLOSURE OF THE EXISTING LANDFARM

DSEIS Section 1.5.2

	TRANSCRIPT COMMENT	COMMENTER	TRANSCRIPT PAGE NOS.
9.	Existing landfarm closure problem - cracks, seepage and ferrets may affect the operation of the clay cap. A 7 foot soil cover is below the frost line.	Davis	57-60
10.	Said that Koch could grow crops on the existing landfarm, once closed.	Hansel	100-101

GENERAL COMMENTS

	TRANSCRIPT COMMENT	COMMENTER	TRANSCRIPT PAGE NOS.
11.	Question of enforcement - No financial penalties for inadequate operation of the proposed landfarm are mentioned in the DSEIS.	Davis	65
12.	Give Koch only a small area for the landfarm to work with initially. They shouldn't need twice as much space for spreading waste since Koch is dewatering to minimize the waste volume.	Davis	68 and 109
13.	If the existing landfarm is not working, why isn't Koch being penalized for it?	Davis	71

14.	What is the enforcement mechanism including penalties for improper operation of the "new" landfarm?	Davis	71

RESPONSE TO COMMENTS RECEIVED AT THE MARCH 3, 1988 PUBLIC MEETING

TRANSCRIPT COMMENT NUMBER

1. The Agency believed that it had not been adequately demonstrated that the existing land treatment facility would meet the more restrictive final facility standards for land treatment and that the existing facility would not qualify for permanent operations. It therefore required that the existing facility be closed.

2. The evaluation of the performance of the existing ponds is beyond the scope of this study; however, in order to provide a conservative/safe analysis of the proposed ponds, a certain amount of leakage was assumed in association with the different alternatives involved in the SEIS. Further information regarding this item is presented in the groundwater quality sections of the draft SEIS.

3. The commenter's belief is more stringent then Minnesota Rules which allow leachate to seep into the groundwater provided that concentration limits are not exceeded.

4. In general, predicting the health effects related to the synergistic effects of volatile organics and PAHs is not possible given the limited information available to date.

   Predicting the toxicity of a complex mixture of PAHs is difficult because interactions among the components may modify toxicity. For example, both carcinogenic and noncarcinogenic PAHs may compete for the same metabolic activating enzymes and thereby reduce the toxicity of carcinogenic PAHs. Exposure to other PAHs can induce enzyme levels leading to more rapid detoxification of B[a]P, reducing its carcinogenicity (Levin et al. 1976). Interactions between B[a]P and benzo[e]pyrene have been shown to have both synergistic and antagonistic effects on mutagenicity (Hass et al. 1981).

   Benzene metabolism, and therefore benzene toxicity, is altered by simultaneous exposure to some other solvents including xylene and toluene. Reported hematotoxic effects of benzene in humans may be a synergistic result of simultaneous exposure to other solvents (e.g., xylene,

toluene) because benzene itself does not induce leukemia in animals (USEPA 1984). Inhibition of benzene metabolism by toluene may result in decreased toxic effects of benzene metabolites but increased toxic effects of benzene itself (USEPA 1984).

Synergistic effects have been observed for exposures to MEK and n-hexane. Combined exposure to 100 ppm of n-hexane and 200 ppm of MEK for 24 weeks resulted in neurotoxic effects in rats whereas such effects were not observed when either chemical was tested by itself (Taleuchi et al. 1983). In addition, Hewitt et al. (1983) found that MEK potentiated the hepatotoxic response of chloroform in rats.

REFS: USEPA. 1984. Health Effects Assessment of Benzene. Office of Emergency and Remedial Response. Cincinnati, Ohio. EPA /540/1-86-037.

Hass, B.S., Brooks, E.E., Schumann, K.E., and Dornfield, S.S. 1981. Synergistic Additive and Antagonistic Mutagenic Responses to Binary Mixtures of Benzo[a]pyrene as Detected by Strains TA98 and TA100 in the Salmonella/Microsome Assay. Environ. Mutagen. 3:159-166.

Levin, W., Wood, A., Chang, R.L., Ryan, D., Thomas, P.E., Yagi, H., Thakker, D.R., Vyas, K., Boyd, C., Chu, S.-Y., Conney, A.H. and Jerina, D.M. 1982. Oxidative Metabolism of Polycyclic Aromatic Hydrocarbons to Ultimate Carcinogens,

Drug Metab. Rev. 13:555-580.

Hewitt, W.R., Brown, E.M., and Plaa, G.L. 1983. Relationship Between the Carbon Skeleton Length of Ketonic Solvents and Potentiation of Chloroform-Induced Hepatotoxicity in Rats. Toxicol. Lett. 16:297-304.

Takeuchi, Y., Ono, Y., Hisanaga, N., et al. 1983. An Experimental Study of the Combined Effects of N-Hexane and Methyl Ethyl Ketone. Br. J. Ind. Med. 40:199-203.

5. Minnesota Rules parts 7045.0484 and 7045.0492 provide for monitoring during the entire operational life of hazardous waste facilities and for as long afterwards as necessary to protect human health and the environment.

6. Koch has sampled groundwater on a quarterly basis and soil pore water via lysimeters since construction of the land treatment facility. They have found no evidence that metals are leaching from the facility in violation of Chapter 7045 of the State Rules. The complete data set is on file at the MPCA for public review.

7. The Agency believes that there is a sufficient body of information proving that heavy metals will not contaminate the groundwater. There will be extensive on-going monitoring of the proposed facility to prevent contamination.

8. It was pointed out that a statement regarding enforcement for controlling emissions was not made in the DSEIS. The MPCA Division of Air Quality conducts yearly inspections of all emission facilities, including Koch Refining Company. At the time of the inspection, the MPCA will review the proposed landfarm as well as any records kept regarding amounts and composition of wastes entering the landfarm. In addition, periodic testing of the waste and/or ambient air may be required in the Air Pollution Control permit for the facility. (An ambient air study is currently being conducted around the entire Koch facility.) If the MPCA determines that emissions from the landfarm represent an unacceptable health or environmental risk, the MPCA has the authority to take whatever action is necessary to reduce the risk. In regards to the expressed desire to see stricter regulations, the MPCA Division of Air Quality has recently initiated procedures to develop regulations for controlling toxic air emissions. These rules will be developed over the next one to two years and as currently planned, will cover those pollutants emitted by Koch.

9. A description of land use restrictions after the closure of the existing facility is presented in the draft SEIS in Section 1.5.2(F) Land Use Restrictions. The closure of the existing facility will be regulated by the MPCA through the permitting process or as provided for by State or interim status rules. The closure will be performed in accordance with applicable regulations including opportunity for public comment.

10. Minnesota Rule 7045.0536, subpart 5 explains the criteria for growing food-chain crops as a post-closure land use. It is possible for a land treatment facility to do so. However, Koch Refining Company has not requested to do this and their permit prohibits growing food-chain crops as a post-closure land use.

11. The operation of the proposed land treatment facility is governed by State Rules and permit conditions. The Agency has an enforcement staff which deals with violations of these conditions and prosecutes under State Statutes.

12. The exact permitted application area will be based upon the land required for correct facility use as determined by the LTD. The area permitted will be based on the amount of land required to provide safe treatment.

13. The Stipulation Agreement of June 23, 1987, between Koch Refining Company and the Agency established the framework for resolving Koch's non-compliance with hazardous waste rules. The Stipulation Agreement is summarized in Section 1.5 of the draft SEIS and Section 1.1.7 of the supporting document, Technical Work Paper 1.

14. The MPCA's enforcement procedure is outlined in response 11.

3.2 COMMENT LETTERS NOT REQUIRING A RESPONSE

Three comment letters were received during the draft SEIS comment period that required no responses. These letters are listed below and reprinted on the following pages.

1. Marian I. Krein dated March 8, 1988

2. Steven G. Loeding, Chairman, Dakota County Board of Commissioners, letter dated March 3, 1988 for the public meeting.

3. Department of the Army, St. Paul District Corps of Engineers, letter dated February 16, 1988.

March 8, 1988

Ms. Marlene Voita
Minnesota Pollution Control Agency
Office of Planning and Review
520 Lafayette Road
St. Paul, Minnesota 55155

Re: Draft
Supplemental Environmental Impact Statement
Proposed New Land Treatment Facility

Dear Ms. Voita:

As a citizen I am tired of fighting Koch Refining. I'm tired of their "gee, gosh, golly we made a mistake in the past" attitude; but "we'll make it better in the future".

I've lived in Rosemount all of my life. I know how powerful Koch Refining has gotten. I know how they can be-little you with their full staff of lawyers and other professional people over powering the 'little people' with their arrogant ways.

Yes, they have polluted the states water. Yes, they have polluted the states air. Yes, they have polluted the states land without anyone challenging their actions to try to put a stop to it.

Do you really think we the people should give them another chance??? WHY??? They have shown us time and time again what they will do given permission with permits etc. to do what they want to without regard to established regulations. They are not in compliance with air and water pollution standards at this time as pending law suits indicate.

Koch has left the agricultural land, woods and roads erosive in their hurry to ram-rod pipelines through the surrounding area.

They SHOULD NOT have been given the permits to expand their facility the last time they applied because they were not in compliance with air and water pollution standards at that time. They certainly SHOULD NOT be given any more permits until they clean up the mess they have already created and show good faith as a good neighbor to this community, county and state.

Sincerely,

Marian I. Krein

Marian I. Krein
12125 Rich Valley Blvd.
Rosemount, Minnesota
55068

3-10

PUBLIC MEETING

Supplemental Environmental Impact Statement on Koch Refining Company
Proposed New Land Treatment Facility Project
March 3, 1988
Rosemount City Hall

Many people sense that Koch Refining Company has to resolve lots of environmental problems caused by releases to the air, land, or water. Multiple sources of existing or potential contamination are evidenced by wastewater discharges, chemical spills or leaks, and groundwater degradation.

Over the last seven months, several odor/air emission incidents are known to have resulted from malfunctions or breakdowns at the wastewater treatment plant/lagoons, the venting of tanks, and upsets with petroleum production processes. While there is understanding that a facility the size and scope of Koch Refining Company will experience periodic operational and maintenance problems, the frustration level is high because little evidence exists that Koch is making an effort to correct these situations. People are concerned for their own individual and family health and safety as well as the general community.

Frustration is especially evident among the residents who live in and around the Rich Valley Boulevard area. They have been exposed to odor or air emission incidents for many years. The local topography of Rich Valley is conducive to the trapping of odors and air pollutants especially when temperature inversions are present. Also, winds may pick up odors and pollutants from non-permitted sources where they may be channeled along the valley for miles before dispersing appreciably.

County officials, together with MPCA staff, have been working hard with Koch staff to address and resolve these environmental problems. Progress has been made on several fronts. Koch officials have agreed to expand and modify the voluntary Pine Bend Area Notification Plan to include airborne emissions and to develop more specific notification procedures for refinery malfunctions or breakdowns. Residents in the refinery area have a right to know what is in the air that may affect their health and safety and to respond appropriately. This plan should be available within the next few weeks.

County Public Health staff are reviewing the Supplemental EIS for the proposed new land treatment facility. Several meetings have been held with MPCA and Koch staff to date to obtain background information, to identify environmental concerns, and to discuss appropriate and sound alternatives. Written County staff comments will be submitted to MPCA by March 18. County staff are also reviewing the alternatives report and air quality permit amendment, both which have public comment periods ending on March 28. The County truly hopes that these cooperative efforts will have immediate and long-term pay-off to resolve existing environmental problems.

The County will continue to exercise its leadership role to advocate on behalf of citizens who live around the refinery to see to it that their air, water, and land is clean, safe, and protected. Koch Refining Company should clearly be expected to use its own funds to take whatever action is necessary to correct its environmental problems before it is allowed to undertake any facility expansion.

Commissioner Steven G. Loeding
Chairman, Dakota County Board of Commissioners

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
1135 U.S. POST OFFICE & CUSTOM HOUSE
ST. PAUL, MINNESOTA 55101-1479

MPCA

February 16, 1988

REPLY TO ATTENTION OF
Construction-Operations
Regulatory Functions 88-366 J-12

TO:

Marlene Voita
MPCA
Office of Planning and Review
520 Lafayette Road
St. Paul,MN 55155

Re: Koch Refining Company's proposed new land treatment facility in the Pine bend Industrial District; sec.24, T115N, R19W, Dakota Co., MN

We have reviewed the information provided us concerning the referenced project. The work you propose at the location stated is not within the jurisdiction of the Corps of Engineers.

No work will be done in a navigable water of the United States, and no dredged or fill material will be placed in any water of the United States, including wetlands. Therefore, a Department of the Army permit is not required to do this work.

This letter is valid only for the project referenced above. If any change in design, location, or purpose is contemplated, contact this office at (612) 725-7558 to avoid doing work that may be in violation of Federal law. PLEASE NOTE THAT THIS CONFIRMATION LETTER DOES NOT ELIMINATE THE NEED FOR STATE, LOCAL, OR OTHER AUTHORIZATIONS, SUCH AS THOSE OF THE DEPARTMENT OF NATURAL RESOURCES OR COUNTY.

If you have any questions, please call Tim Fell.

Sincerely,

Timothy J Fell

Ben A. Wopat
Chief, Regulatory Functions Branch
Construction-Operations Division

3-12

3.3 COMMENT LETTERS AND RESPONSES

Three comment letters were received for which responses were required. These letters are listed below and reprinted on the following pages. Specific comments in the letters for which responses were developed are noted in the margins and numbered. The numbers correspond to the numbers on the responses to comment letters immediately following the letters.

1. Dakota County Human Services Division letter dated March 18, 1988

2. Minnesota Department of Natural Resources letter dated March 17, 1988

3. Metropolitan Council letter dated March 18, 1988.

DAKOTA COUNTY

(612) 450-2611

HUMAN SERVICES DIVISION 33 EAST WENTWORTH, WEST ST. PAUL, MINNESOTA 55118

REPLY TO:

- ☐ Human Services Director, (612) 450-2742
- ☐ Planning (612) 450-2742
- ☐ Employment & Economic Assistance, (612) 450-2611
- ☐ Public Health, (612) 450-2614
- ☐ Social Services, (612) 450-2677
- ☐ Veteran's Services, (612) 450-2601

33 East Wentworth
West St. Paul, MN 55118

☐ Public Health (Nursing Service)
1101 West County Road 42
Burnsville, MN 55337
(612) 435-8055

☐ Social Services
900 West 128th Street
Burnsville, MN 55337
(612) 895-3577

March 18, 1988

Ms. Marlene Voita
Office of Planning and Review
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Dear Marlene:

Dakota County Public Health staff welcome the opportunity to comment on the draft Supplemental Environmental Impact Statement for the Koch Refining Company's proposed new land treatment facility. County staff appreciate the openness shown by the MPCA in working with Dakota County towards our common goal, that of protecting the public health and environment.

County staff strongly urge the MPCA to require an additional supplemental environmental impact statement for this project upon Koch's completion of the land treatment demonstration next year. This supplemental EIS would incorporate the results of the demonstration project (results which ideally would have been available at this time) and suggest loading rates, modifications to the operating parameters, and final sizing of the land treatment facility. Alternatives to the proposal could include all other alternatives listed in the current SEIS, but especially focus on the on-site landfill with waste minimization and chemical fixation.

We urge the MPCA to follow this course to assure that all affected parties have an opportunity for proper review of this project after the required data has been collected. Under normal circumstances, the timeline for review is more extended and allows for greater study for both the Agency and other interested parties. In this instance, with the compressed time frame established under the consent order, the Agency is prepared to finalize this SEIS and grant the facility permit before a land treatment demonstration (required as part of the SEIS), has begun. Without a supplemental EIS after the treatment demonstration is completed, public review (and, to an extent, Agency review) is stopped at the permitting process this summer.

1 con't If the Agency chooses not to require an additional supplemental EIS, and during the course of the demonstration project Koch is required to make several major revisions of their intended application rates, operating methods, etc., what review method will the Agency use to ensure proper, safe operation of the new land treatment facility? County staff feel an additional supplemental EIS would be a vehicle that the Agency and area residents could use to allow a proper review of the information.

The final supplemental environmental impact statement will, in the estimation of Public Health staff, require the following additions to the draft;

1a 1. Significant modification and revision of the draft SEIS needs to be undertaken in the areas of groundwater quality and leachate generation, the construction and operation of the land treatment facility including the size of the landfarm cells and proposed loading rates, and air quality modelling.

1b 2. Koch Refining Company staff have proposed a project which differs significantly from those described in the draft SEIS. The final SEIS should address their proposal.

1c 3. The additional SEIS mentioned above should be incorporated into the final SEIS.

Staff of Dakota County look forward to working with MPCA staff and officials of Koch Refining Company on this and other matters.

Our comments on the proposed project and its alternatives follow this letter.

Sincerely,

George Kinney
Lead Worker/Hazardous
Waste Management (450-2793)

Ronald Spong
Lead Worker/Water
Quality Management (450-2607)

cc: Donna M. Anderson, Public Health Director
Mike Hansel, Koch Refining Co.

COMMENTS

A. Hazardous Waste Rules Requirements

2 MN Rule 7045.0536 Subp. 2.A. states that all hazardous constituents applied to a landfarm must be degraded, transformed, or immobilized within the treatment zone which Koch claims as 60 inches. This has not been shown in the draft SEIS. The draft SEIS reduced 37 organics and metals found in Koch's hazardous waste to 10 indicator parameters on the basis of human health risk, not movement in the environment as required by Minnesota Rules, and did not consider any intermediate chemicals formed from the waste during degradation. Since all hazardous constituents must be shown to be degraded, transformed or immobilized, the reduction to 10 indicators is improper. In addition the final SEIS should define how volatilization from the landfarm is a form of treatment.

B. Scoping Document Requirements

3 The final scoping decision document, passed by the MPCA Citizen Board on August 25, 1987, requires several items to be included, "if available", in the draft SEIS. These include the results of the laboratory treatability studies which have recently been made available but were not in the draft SEIS, a computer simulation for constituent mobility which was not included in the draft SEIS, performance data from the existing land treatment farm including groundwater and unsaturated zone monitoring (inadequately addressed in the draft SEIS), the field demonstration study (which staff understands will not begin until the winter of 1988-1989), and the new land treatment farm design which, although addressed, is incomplete because of sizing, changes in soils to which waste will be applied, and inadequate discussion of operating practices. Required information under the facility layout section include a discussion of hydraulic loading, waste application rates, stabilized oil concentrations and target nutrient levels. All of this information needs to be addressed in the final SEIS.

4 Dakota County staff commented, during the scoping process, that the proposed land treatment facility's location updgradient of the present landfarm will necessitate a well-designed, complex monitoring system for unsaturated and saturated zone monitoring. This system will need to be capable of distinguishing the movement of hazardous constituents from the proposed landfarm as opposed to the existing landfarm. MPCA response to this comment was that it would be addressed during permitting. We feel this comment is still valid, and, under the scoping outline I.D.2.b.(2)(e) "Proposed...unsaturated zone monitoring and groundwater monitoring", is appropriate to be discussed in this document. As staff have verbally transmitted to the MPCA staff, it is possible that monitoring well 8 is not truly an upgradient well and placement of future wells should take into account the lateral spread of landfarm constituents through the 60-90 feet of unsaturated outwash.

C. Land Treatment Farm Temperature

5 The laboratory treatability study recently completed used natural Wadena loam (which will not be the soil of the proposed LTF) at laboratory temperatures (usually 20 degrees Celsius). No temperature variation was performed, although soil temperature is very important to microbial activity. A review of literature indicates very little appreciable biodegradation occurs below 15 degrees Celsius (59 degrees Fahrenheit), which will not be reached in Waukegan loam until at at least mid-May (Hydrologic Characterization Report), not April 1 as stated in the draft SEIS.

D. Groundwater Quality Analysis

6 The groundwater quality analysis is totally inadequate. The draft SEIS does not address the hazardous constituents of concern, but only those "indicator chemicals" chosen by availability of toxicity values in the literature. Under Minnesota Rules, all hazardous constituents must be degraded, transformed or immobilized within the treatment zone, not just those proven to be carcinogenic or highly toxic. Several volatiles and semivolatiles present in Koch waste are water soluble, but all four chosen organic "indicator chemicals" are insoluble. The subsequent analysis of leachate quality, technical work paper 1, Appendix D, is also inadequate.

7 The statement has been made that Appendix D, Leachate Quality, is a worst case scenario because the total annual loading is placed on the landfarm at one time (April first). The waste is then given the entire treatment season to degrade with no additional loading which is not "worst case." Appendix I on the other hand, assumes waste is applied to the landfarm every other day, which is more realistic. Waste applied late in the season will not totally degrade. The analysis in Appendix D is lacking elementary soil chemistry, partition coefficients, coordination chemistry corrections for soil temperature (the current equation assumes 77 degrees Fahrenheit, hardly soil temperature on April 1), and any partitioning between oily waste and

8 water (DAF float is 11% oil). The current equations are derived from a study of volatile organic chemicals present in drinking water, which is not applicable to oily waste deposited on soils. Many of the missing partition coefficents are present in the Appendix I (work paper 1) "Volatilization Modeling " and in the Auxiliary Reports prepared by Barr Engineering. Additional, specific comments will be made in the attached document.

9 Appendix C of the Closure Plan for the Existing Hazardous Waste Facility lists a number of metals present in monitoring wells W4 to W8 which are above the groundwater protection standard as given in MN Rule 7045. 0484 Subpart 7. The metals of concern are barium, cadmium, mercury, and selenium. The draft supplemental environmental impact statement states that the proposed landfarm, kept aerobic and near

9 con't neutral conditions, will have no problems with movement of metals as they shall "remain insoluble and adsorb to the soil matrix." This scenario has obviously not taken place in the existing landfarm. Additionally, if the metals do adsorb to cation exchange sites, a great number of these available sites will <u>not</u> be oil-covered soil particles but rather humic acid and other soluble and suspended organics. These will migrate downward out of the treatment zone.

10 With high total dissolved solids, which will be present in the proposed facility (and in Alternative 2), a slight reduction in aerobic conditions may cause a shift to a highly reducing atmosphere, even with a nearly stable pH. Under reducing conditions, metals will solublize quite readily. A review of the literature finds aerobic conditions are extremely difficult to maintain below 15 cm (maximum 20 cm) or 6-8 inches. All work in the draft SEIS used 12 inches for the zone of incorporation, which may mean the lower portion of the zone of incorporation will become anaerobic with reducing conditions and dissolved metals.

E. Inappropriate Sources

11 Throughout the draft SEIS, many of the references are cited as "Personal Communication" or in-house reports by the consulting firm. Many assumptions are based on data received in this manner. It is nearly impossible for an independent reviewer to adequately review an make pertinent comments on analyses relying on unpublished material.

12 It would be preferable to have all data and assumptions subjected to rigorous peer review in journals. For example, much of the leachate quality study done in the SEIS is based on an ICF Clement paper entitled "Inhalation Exposures to Volatile Organic Contaminants in th Shower." Dakota County staff have recently reviewed this paper, which has not been subjected to peer review, and found the study bear little, if any, relevancy to the proposed project, while other published work on land treatment farms does exist.

F. Construction of Land Treatment Farm

13 The proposed land treatment farm is shown in the draft SEIS as a gently contoured 40 acres drained by swales which separate the cells. Elevations across the proposed schematic range from 862 feet to 906 feet. The existing topography of the site shows several hills and three or four closed depressions, with elevations from below 860 to above 920 feet. No mention is made in the draft SEIS or attached wor papers of the obvious soils removal and recontouring which must take place. Throughout the draft SEIS and work papers, "natural Wadena Loam" is listed as the soil on the proposed site. The soil will not be natural, as the soil structure must be remanufactured after

13 con't. landfarm contouring and construction. In addition, Wadena Loam only covers about one third of the current site, with several other, less desirable, soils present. The proposed landfarm is adjacent to a large gravel pit; it may be assumed the subsoils which must be removed during construction will be similar, and the landfarm, when operating, will have extremely porous gravels beneath it.

The final SEIS must address the construction process, including the replacement of topsoil and subsoils and formation of soil structure before land farming begins.

G. Air Quality Modelling

14 The model used for air quality determinations (Appendix J, work paper 1) for the onsite incinerator and land disposal alternatives is improper for the landfarms and landfill. Emissions are assumed continuous, although the draft SEIS clearly states the waste will be batch processed in alternatives 1, 2 and 5, and published literature on land treatment facilities discuss the logarithmic nature of volatile emissions immediately after application to landfarms. The terrain is modeled as level although the proposed landfarm or landfill will not be level, nor is the surrounding Rich Valley area.

H. Waste Minimization Requirements

A program in place to accomplish waste minimization is required by state and federal regulations, as stated in Section 2.1.4 of the draft SEIS. Alternative 1 may not meet the spirit of this regulation, as the segregation of wastes into nonhazardous, low solids and high solids does not reduce the volume or toxicity of those wastes. Alternatives 2 and 5 both have waste minimization in the form of removal of water and dissolved wastes, which does reduce both volume and toxicity. In addition, Alternative 5 proposes to chemfix the wastes, further lowering the hazard.

I. Koch Refining Company Proposal

In our discussions about the draft SEIS with officials of Koch Refining Company, we have learned that they wish to construct a landfarm onsite which is more similar to alternative 2 than the
15 proposed project, but is not an alternative described in the draft SEIS. In order for the SEIS process to be meaningful, the Koch landfarm proposal must be described in detail and examined in full in the final SEIS.

COMPARISONS OF ALTERNATIVES

In comparing the alternatives presented, County staff would have concerns with each of the onsite proposals, in varying degrees. Staf believe the offsite alternatives, while more environmentally sound o the immediate area around Pine Bend, would economically impact the refinery because of the great increase in cost. These choices may prove more attractive as additional data are gathered concerning th onsite alternatives, and will need to be included in the review process undertaken upon completion of the land treatment demonstration.

The onsite incinerator, alternative 7, is a questionable choice due t permitting another air emissions source in an area which has nonattainment status for sulfur compounds and particulates. Stabilizing the ash and placing it onsite in a landfill with a liner and leachate collection system, however, would ensure little adverse environmental effects.

Alternative 5, the onsite landfill, would have less environmental and public health impact than the other two landbased alternatives. Although the draft SEIS claims the landfill would leach toluene and xylene into the groundwater while alternatives 1 and 2 would not, County staff believe a well operated landfill, with proper chemical fixation of wastes and well designed multiple liner system with leachate collection systems, will impact groundwater quality much l ss than either landfarm proposal. County staff have commented elsewhere on the improper calculations used in the draft SEIS to claim no groundwater impact from metals or organics from the proposed landfarms. The landfill would also reduce air quality impacts from those expected with the two landfarm proposals. Operation of the press system for waste minimization must be done in such a manner a to capture the volatile organics before they are released into the atmosphere. The chemical fixation process must also be done in such a manner as to reduce escape of organics to the atmosphere or to the groundwater. The leachate collection and liner system as proposed
15a (draft SEIS, Section 3.4.1(a)(ii), page 3-118), may not be adequate and additional design parameters need to be described in the final SEIS in order to evaluate it fully. Alternative 2, landfarming onsi e with waste minimization, is more acceptable than the proposed proje t as it has less impact on the groundwater and air quality. County staff feel, however, that many questions must be addressed in the final SEIS concerning chemicals leaching from the landfarm, operati g parameters for the landfarm, the construction process necessary to recontour the landfarm and the soils which will actually be used, and other questions which have been raised elsewhere in these comments.

TECHNICAL WORK PAPER 1.

APPENDIX B. DOWNGRADIENT GROUNDWATER QUALITY

Conclusions The groundwater quality assessment is incomplete. Additional data needs to be supplied in the final SEIS. Some specific comments follow:

16 1. No data is available for dates after October, 1986. Since sampling is done quarterly, and this technical work paper was prepared in late 1987-early 1988, additional data should have been available for fourth quarter 1986 and the first 3 quarters of 1987, and should appear in the final SEIS.

17 2. All metals analyses are performed on samples filtered in the field using a 0.45 micron filter. This filter is designed to remove anything as small as a bacterium, including particulate matter. County staff feel metals, and some organics, may adsorb to particulate matter and be entrained out of the treatment zone. This particulate material is found in the lysimeters, and in the monitoring wells. We feel inaccurate conclusions are reached by never analyzing unfiltered samples, as the possibility exists of high concentrations of metals and some insoluble organics present in these wells. We suggest comparisons be done of total samples and filtered samples for all wells for several quarters.

APPENDIX D. DETERMINATION OF LEACHATE QUALITY

Conclusions The calculations presented are superficial and inadequate. Unwarranted simplifying assumptions are made. Some specific comments are:

1. In the discussion on metals, adsorption of the metal species to the soil is given as the sole fate of metals 18 deposited in the landfarm. It is reasonable to assume much of the soil will be coated with oil and unable to provide cation exchange sites for the metals present in the waste. These metals may instead become bound to soluble or semi-soluble ligands/chelating agents present in the waste and percolate out of the treatment zone. In addition, it will be quite difficult to maintain aerobic conditions in the lower half of the proposed 12 inch zone of incorporation. Under an aerobic condition, the metals will solubilize and move out of the treatment zone.

2. Sodium and chloride are the only "miscellaneous 19 inorganics" followed through the draft SEIS, for reasons which are not explained on page 2-5 of the draft. Many other inorganics could be chosen, and should be mentioned as additional concerns in the conclusions section of the SEIS.

3. The calculations for organic parameters are not proper. Benzo[a]pyrene is not a proper indicator chemical for 20 the entire semi-volatile category, as it has little chemical resemblance to phenol or cresol. The three chosen volatiles are insoluble, while methylethyl ketone, found at a concentration 16 times higher than benzene in DAF float (11/18/86), is soluble in water. On page 3-4 of the draft SEIS, methylethyl ketone is eliminated as a chemical of concern as it was "not detected in the air in DuPont's experimental studies at landfarms." If it is not in the air, it is logical to find it in the water.

4. The current approach to the problem, which is to assume a certain "initial concentration" and then allow 214 21 days for degradation/volatilzation, is not proper. The concentrations need to be recalculated for each Hazardous Waste Unit or cell, preferably using a 6 inch depth as shown in literature, and each application of waste to the landfarm needs to be factored in as is explained in Appendix I. The gas exchange and liquid 22 exchange coefficients used are over simplifications as the oily waste taken to the landfarm will need

22 con't additional factors for oil-water, oil-air, oil-soil, etc. Remember that DAF float is 11% - 13% oil, and is the vast majority of the waste treated in Unit 1. Unit 2 should be calculated separately. Aromatic and aliphatic hydrocarbons are not generally water-soluble, and may be found in the oil phase, a fact that is neglected completely in the current calculations.

23 In addition, soil temperatures will not be high enough on April 1, nor on October 31, for adequate degradation to occur. Using Table 7 of the Hydrologic Characterization Report prepared by Barr (which is based on Waukegan Loam, not remanufactured soils) it may be estimated that 50 degrees Fahrenheit will not be reached at a 6 inch soil depth until mid-May, and 59 degrees Fahrenheit (15 degrees Celsius - mesophilic bacterial temperatures) will be reached in late May or early June. The soil may cool to end the application season by mid to late September, based on Table 7. Using this approach, effective degradation/volatilization is limited to less than 150 days, not 214 days as is stated in the draft SEIS. This would mean higher application rates during the application season, or a larger land treatment facility.

24 Intermediate chemicals which will be formed as by products of biodegradation steps may also be chemicals of concern. During cold weather, psychrophilic bacteria will continue to metabolize, at a slow rate, and produce intermediate breakdown products form long chain aliphatic hydrocarbons. Very little volatilization occurs at cold temperatures. Only a few genera of psychrophiles exist, with a correspondingly few metabolic pathways explored by these bacteria. The result will be a build up of metabolic products in the landfarm soils during the cold fall and spring months. These products may leach out of the treatment zone during the spring melt, or remain and prove toxic to mesophilic organisms.

APPENDIX E. DETERMINATION OF GROUNDWATER IMPACTS - REVIEW AND COMMENT

Conclusions The groundwater quality impact assessment is superficial and inaccurate. Some of the many criticisms follow:

1. Assumptions based upon Barr Engineering Co.'s Hydrogeologic Characterization, October 1, 1987, are adopted and applied without critical review and specificity. Among the many simplifying assumptions, the following are made inaccurately:

25 a.) Variable hydraulic conductivity exists below the proposed landfarm or landfill because the water table aquifer is anisotropic. Only a portion of the subcrop below the water table is identified as weathered St. Peter sandstone. The Willow River dolostone (Prairie du Chien group) and Rosemount outwash are also present. Contaminants entering upgradient of the St. Peter sandstone subcrop may not necessarily migrate through it given differential conductivities, optimum flow paths (secondary porosity, such as fractures), etc. Contaminants entering the dolostone may migrate preferentially through fractures and conduits;

26 b.) The leachate derived from either the landfarm or landfill will not be homogeneous and will not migrate uniformly. The leachate will include dissolved, suspended and residual (solid) contaminants of concern, as well as indicator parameters, with variable densities and retardation factors, preferred flow paths, and other characteristics which will eventually cause them to segregate downgradient both laterally and vertically;

27 c.) Dissolved volatile organic chemicals, for example, may precede the more retarded contaminants and their indicators and, yet, migrate at approximately 75 to 95 percent of the observed hydraulic conductivity;

28 d.) Although anisotropic conditions prevail with predominant northeast groundwater flow towards the Mississippi River Valley, mixing may occur in secondary openings (e.g., fractures and conduits) with minor to major lateral spreading and vertical distribution, especially for certain volatile organic chemicals and other volatile and nonvolatile organic chemicals respectively;

2. The calculated volume of leachate generated from the
29 landfarm during its operating life and during any given year of operation includes only infiltration/percolation water an and water, oil and solids associated with the land-applied oily wastes which will be the most significant for alternative #1 (no waste minimization) less significant (unknown) for Alternative #2 (waste minimization). Since only dissolved constituents are considered to migrate, a gross underestimation of leachate generation and migration is calculated;

3. The analysis predicts that the volatile aromatics (benzene, xylene and toluene), metals and other contaminants of concern will either not migrate or, for example, due to their limited solubility, will be significantly diluted (e.g., benzo[a]pyrene). Only the release of sodium and chloride are predicted to occur with a substantially detectable concentration in groundwater. This analysis is inaccurate for many reasons including:

30 a.) The leachate will be comprised of dissolved, suspended and residual solid phases which will differentially migrate to the saturated zone - not just dissolved contaminants or indicators;

31 b.) Volatile aromatic hydrocarbons will migrate in the leachate to the groundwater since, to meet RCRA permit specifications, volatilization to the atmosphere can not be considered a treatment method and since retention of such volatiles in the treatment zone predisposes their migration through the unsaturated
32 zone to the saturated zone. Additionally, volatile organics may also migrate by vapor phase through the unsaturated zone to the water table;

33 c.) Metals may migrate as dissolved species, as coordinated species (ligands), as adsorbed to colloids, other suspended and residual particles, and as precipitated solids. They may also be biologically transformed forming more toxic compounds (methylmercury, e.g.);

34 d.) Semi-volatile PAH's and similar organics are not well represented by benzo[a]pyrene with respect to transport fate characteristics.

APPENDIX I: VOLATILIZATION MODELING USED TO ESTIMATE EMISSION RATES - REVIEW AND COMMENT

Conclusions The primary constraints to the volatilization modeling for the land treatment farm alternatives are the questionable assumptions made in order to estimate emission rates. Due to such assumptions emission rate estimates are doubtful, especially when applied to evaluate air quality impacts, treatment regimes, and exposure assessment of risks. Some specific comments follow:

1. The land application of refinery oily wastes is known in the literature reviewed to comprise two phases of emissions of volatile hydrocarbons, namely (a) a high concentration phase during application and tillage events, and (b) a low concentration phase during stabilization and degradation. The high concentration phase may be several orders of magnitude (10^2 to 10^4) greater than the low concentration phase and is distributed log -normally over an approximate 30 to 60-minute time period upon the commencement of land application and tillage of the wastes. Subsequently, after waste application and tillage events, volatilization of hydrocarbons decreases to approximate steady-state conditions with emission rates controlled by waste and soil characteristics, etc. Therefore, modeling must account for both emission phases through time (i.e., approximately 1 hour peak concentration followed by 23 hours of approximate steady state (low) concentration). The use of the 1-hour peak emission rate for malodorous emissions (methylmercaptan) alone is illogical.

35

2. Assumptions considered only the use of <u>in situ</u> Wadena loam soils, isothermal conditions, soil application depth of 12 inches (30.5 cm), uniformly applied (set application rate of uniform mass loading for each parameter examined individually), etc., under ideal conditions for the simplicity of modeling and calculations. The assumptions, modeling and calculations do not address the non-volatile oily waste component, its chromatographic-like separation in the soil as it migrates laterally and vertically in the soil during application and tillage (i.e., parafins, asphaltics, other heavy ends and large solids being segregated in top of the soil profile with the lighter, less dense fractions and finely divided solids migrating deeper into the profile), the displacement and sealing of soil air by the oily wastes, etc. The variable surface area for emissions would be further controlled by precipitation/runoff, evapotranspiration and field capacity of soil, etc.;

36

3. Each new waste application every 48 hours was assumed
37 to be added to the previously land applied area so that the residual hydrocarbon (non-volatile fraction) mass would dilute the new waste added. The oily wastes were assumed to have a half-life of 150 days and that the newly applied wastes were mixed uniformly to a depth of 12 inches (30.5cm). The operational practice of reapplying the oily waste every two days to the same soil is not recommended in the literature reviewed. In fact, stabilization is preferred with intermediate tillage and nutrient (N,P,K,etc.) and agricultural lime application to encourage biomass growth and biodegradation. Disruption every 48 hours is contraindicated. In accordance with literature recommendations, such 48 - hour dilution factoring should not be utilized. Also, there is no evidence that the half-life of the oily wastes approaches 150 days in the Koch Refining Company environment. Therefore, recalculating the given equations will yield higher emission rates. These may still be incorrect because of other factors. They certainly do not represent an upper bound as indicated.

4. Since the concentration of volatile aromatic and
38 aliphatic hydrocarbons (in addition to benzene, xylene, toluene and benzo-[a]-pyrene) is significant and may represent both acute and chronic, noncarcinogenic exposures to human receptors, emission rates for total volatile hydrocarbons should be appropriately modeled and calculated to properly assess impacts.

Appendix J: Air Quality Modeling Protocol - Review and Comment

Conclusions With the possible qualified exception of the on-site hazardous waste incinerator alternative, the air quality modeling of the on-site land treatment and on-site land disposal options is not appropriate for the purposes of adequately determining the impacts of air emissions of malodors (e.g., methylmercaptan), toxic organic compounds (e.g., volatiles, such as benzene, and semivolatiles, such as PAH's), other hydrocarbons (e.g., aliphatics) and other criteria/noncriteria pollutants. There are a number of substantial reasons for this conclusion including:

39 1. It is questionable whether the USEPA's ISCST and CALMPRO models utilizing the McElroy-Pooler dispersion coefficients (urban mode 3) are applicable to a rural-urban fringe area source;

40 2. Years 1973-1977 database utilizing Minneapolis-St. Paul International Airport hourly surface (868 feet above sea level) meteorological observations and St. Cloud pilot balloon vertical soundings includes two years (1976-77) of an approximate 42-44 year drought cycle. The database should be expanded to include data from 1978 through 1987 to reflect variance, perturbations, and secular trends;

41 3. Topographic effects on microscale and mesoscale weather correlated with episodic air pollution events (thermal inversion trapping, plume fumigation, scavenging, etc.) are not addressed. In particular, the Mississippi River Valley, Rich Valley and the Kame and Kettle, Kettle and Moraine topography (Eagan to Inver Grove Heights) all serve to trap and pool slowly and poorly dispersing plumes;

42 4. Local topography and refinery facility layout (buildings and structures) perturb microscale meteorological conditions and are not addressed. They may aggravate episodic upsets, accidents and other refinery releases by limiting dispersion (cavities and wakes in the lee of buildings and structures, trapping, pooling and entrainment in closed depresions, swales, ravines, etc.);

5. The models may be appropriate for elevated stack, line and area continuous sources in which Gaussian plume dispersion and trajectory approach steady state uniformity, but other models (including Gaussian puff model, box model, etc.) may more appropriately define the ground level release, migration and dispersion of air pollutants during the discrete discontinuous events of land application/farming and land disposal/chemical stabilization (chemfixing); 43

6. For land application of refinery oily wastes, studies have demonstrated that maximium volatilization occurs during the transfer, handling and application events and achieves baseline conditions within the first 30 to 60 minutes after applications. Subsequent plowing events create rapid but short releases of volatile hydrocarbons. Steady state volatilization between application and plowing events is dependent upon the specific characteristics of climate, soil, waste, and management practices; 44

7. Prompting the model with extraneous (undefined) factors and incorrect constants which are not applicable to landfarming or land disposal at the site does not yield meaningful results. For both the landfarm and land disposal alternatives, the area source was given an air emission height of 1 meter when, in fact they are both at ground level (0 meter elevation). The Pasquill stability index is compromised by utilizing an emission temperature of 0 degrees Kelvin (-273 degrees Celsius). If hourly weather observations were utilized for windspeed and direction (based upon 2-minute averages), then hourly (60-minutes) means and standard deviations were not utilized as required for calculating model dispersion and advection. The volatile hydrocarbon emission rate of 1 gram per second is estimated utilizing questionable assumptions including a continuous area emission source and reducing the rate by the unit area released; 45

8. Ground level emissions of heavier than air hydrocarbons (volatile aromatics, aliphatics, etc.) at ambient temperatures may not loft due to the topographic barriers (valley slope and swales for the landfarm, and closed depression for the landfill) to prevailing winds, crosswinds and eddies. Such plumes may become entrained or trapped entering Rich Valley, for example, and fumigating until eventually dispersing; 46

47 9. The model is run throughout the calendar year (January 1 through December 31) even though the stated landfarm operational period is April through October;

48 10. The model assumes a continuous area emission source when, in fact, there will be high concentrations (at lease 10 above baseline emission rate) during landfarming application and tillage and landfilling (chemical stabilization) events. The discrete, short-term, high emissions are log-normally distributed with the mode representing the worst-case emission rate.

KOCH REFINING COMPANY SEIS
LAND TREATMENT FARM (LTF) ALTERNATIVES
REVIEW AND COMMENT

Conclusions. The two land treatment farm (LTF) alternatives, #1 without waste minimization and #2 with waste minimization, are
49 inadequately discussed in the SEIS because (a) insufficient information and data were available at the time of the review,
50 (b) Koch Refining Company (KRC) has altered its proposed designs and operating procedures a number of times and appears to be contemplating additional changes, (c) the existing landfarm has not been thoroughly
51 studied to discover why it failed operationally and why the unsaturated and saturated zone monitoring system failed to detect significant contaminant release with subsequent application of the results to the new LTF design, and (d) RCRA final permitting prohibits
52 the volatilization of hazardous wastes as an approved land treatment mechanism.

Since the land application of oily wastes is the preferred alternative of KRC and the Minnesota Pollution Control Agency (MPCA) for a number of reasons, the selection of this alternative has already been made. Lacking the diligent, multidisciplinary review essential to such a complex technology that has not received the same level of scrutiny as other alternatives have, the land treatment of petroleum refinery wastes requires much critical review. Although there are many potential indicators for success should waste minimization,
52a pretreatment and segregated land application strategies be implemented, only a protracted (more than 1 year) and carefully designed demonstration project with multimedia data acquisition and early-on operational modification (additional information and data from a more rigorous study of the existing landfarm, e.g.) will adequately resolve the issues and establish sufficient design and operational detail for the facility's final permit. Because of the level of uncertainty prevalent at this stage in the SEIS and final permit process, secondary alternatives, such as Alternative #5, on-
53 site landfilling of chemically stabilized oily wastes, and Alternative #7, on-site incineration with ash treatment, may have to be reconsidered in an additional supplemental environmental impact statement (SEIS) once sufficient information and data are accumulated.

54 Staff's concern is that the MPCA's final permit requirements for the LTF will not be specific enough due to the significant dependence on the demonstration project. Since the primary treatment of the oily wastes is biodegradation, the one-year demonstration project may be too short to establish steady state conditions (even though inoculated with microbes from the existing landfarm) and yield statistically significant results. Therefore, defining the future LTF's operational parameters may be premature and incomplete, subjecting it to possible failure.

Numerous comments can be made concerning the inadequacy of the SEIS with respect to the LTF alternatives. The following summary must suffice:

1. Existing landfarm.

55 a. The SEIS does not prove the existing landfarm's success or address its apparent failure which exceeds API and other authorities recommended incorporation depths (115cm instead of 10 to 20cm), application rates (> 6lbs/ft^2/year instead of a maximum of 2lbs/ft^2/year), and operating conditions (months of year; soil temperature, moisture, pH, etc.; stabilization period; aeration; etc.).
b. Significant oil and grease were detected in one soil boring at a depth of 13 feet, fully 8 feet deeper than the RCRA 5-foot land treatment zone. Since site soil exploration within and adjacent to the existing landfarm have been limited, it is possible that significant lateral and vertical oily waste migration has occurred. Slant soil borings beneath the existing cells would be beneficial to determine such migration, some of which is bulk flow from soil overloading.

c. Unsaturated zone monitoring relied upon questionably installed and unreliably sampled pressure-vacuum lysimeters. Some sample collection reports note that collection volumes were minimal, soil pore water was turbid, etc. Since samples were filtered (45-micron) before analysis, precipitates, colloids, emulsoids, and other material that could pass the silica flour and fine ceramic frits were excluded from analysis. Also excluded were those materials which could not pass through the silica flour and ceramic frits. Additionally, the location, installation, operation and reliability of such lysimeters is questionable. Since the existing and adjacent proposed LTF sites are characterized by a very thick unsaturated zone (40 to 70 feet) comprised
56 predominantly of Rosemount outwash sands and gravels, the volume of oily wastes migrating into and either retained in, retarded in or released from the vadose zone is undoubtedly significant whether or not degraded. Careful study of some of the existing lysimeters would be very cogent to the proposed unsaturated zone monitoring plan.

57 d. Saturated zone monitoring relied upon variably constructed water table wells screened-off or with open holes to one or more unconsolidated or consolidated formations. Monitoring well locations, depth, construction type and materials, etc., were not carefully planned in advance yielding questionably reliable or comparable data.

57 con't. Again, only filtered samples were evaluated leading to the above-described, incomplete monitoring. Upgradient monitoring wells may have been placed too close to the existing landfarm since the lateral amd vertical spreading of contaminants and indicators through the thick unsaturated zone may have affected water quality over a greater area. The lack of the t-statistic's sensitivity to quasi-normal distributed data, infrequent, missing or below detection limit data, and non-representative upgradient background data are well known. Therefore, analysis to date is highly suspect. Also important is the non-homogeneous water table groundwater flow regime beneath the existing landfarm and the proposed LTF. Preferential flow paths may exist which could laterally displace and/or vertically direct contaminants and their indicators around less permeable (lower hydraulic conductivity) materials. A case in point may suffice: watertable groundwater flow from the Rosemount outwash/weathered Willow-River dolostone southwest of the sites to the northeast encounters the interjacent, weathered St. Peter sandstone whose residual, subcropped knolls cap the buried Pine Bend headland. The flow paths may deviate around such buried knolls, as well as select more permeable routes through the fractured, cavernous dolostone. Tracer injection and recovery, slug, pumping and other well tests, borehole video and geophysical logging, surface geophysical reconnaisance, etc., are some of the available methods to lend more deliberate scrutiny to the existing landfarm's and the proposed LTF site's groundwater monitoring plan.

2. Proposed Land Treatment Farm (LTF).

a. In the County staff's view, alternative #1 (no waste minimization) is indefensable from legal, environmental and ethical viewpoints. Importantly, but not satisfactorily identified in the SEIS, excessive mixing of dissimilar water-laden wastes with soil and utilizing poor land application practices (cited above) at the existing landfarm has lead to probable failure. To continue such practices are not prudent. Waste minimization, together with waste segregation, pretreatment and other appopriate handling, needs to be addressed and evaluated in greater detail in the SEIS since it is the most reasonable of the two landfarm alternatives proposed. KRC has already modified its proposals relevant to waste minimization and may further change them. Such modifications may have other unaddressed implications.

58 b. The location of the proposed LTF (immediately south of the existing landfarm) is not recommended for several reasons: (i) The site is so close to the existing landfarm that both unsaturated zone and saturated zone monitoring will not be able to differentiate between the landfarms as the source of detected contaminants and indicators.

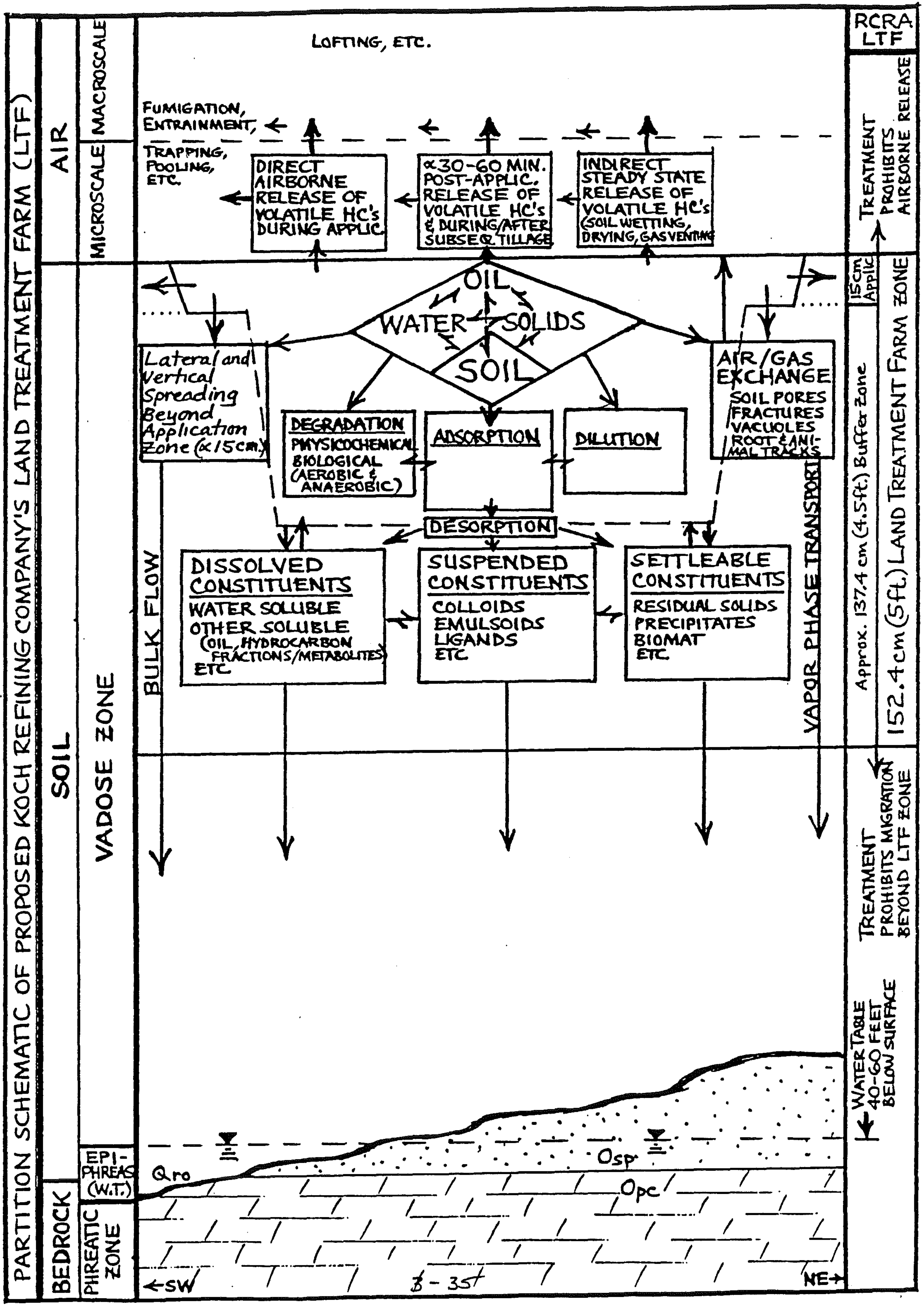
58 con't. Therefore, the regulators (MPCA and Dakota County) will be unable to verify a contaminant's release because its source may be in doubt; (ii) The site must be substantially cut down and excavated (70% of area) to achieve designed slopes, swales, etc., which will remove and destroy in situ soils and expose the parent Rosemount outwash sand and gravels beneath. Only a small portion of the Wadena loam remains somewhat untouched on the northwest corner of the site as some site excavation has already begun; (iii) Several closed depressions are present in the southeast and northeast areas of the proposed site. Since surface water runoff disappears into such depressions, they reflect, in some cases, more permeable zones in the underlying outwash and subcropped bedrock. Such areas should be carefully evaluated before the proposed landfarm is constructed;

59 (iv) Reliance on remanufactured soil in the proposed LTF's hazardous waste units is contraindicated. Once the natural soil structure is disturbed or destroyed, its characteristic properties are no longer applicable in evaluating oily waste assimilation. Reconstituting soil to certain physical and chemical charateristics does not restore the complex, natural soil structure. Generally, with most soils mapped within the proposed site, their remanufactured composite will be more porous and permeable.

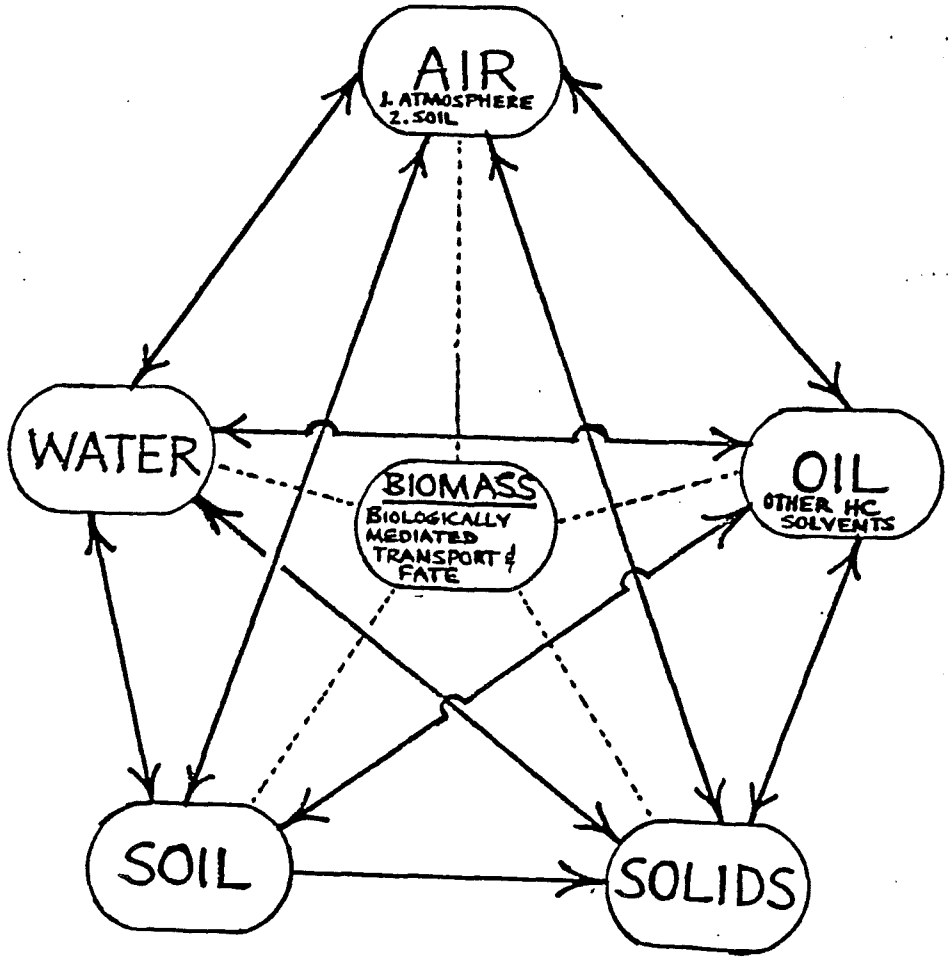
c. Land Treatment Farm (LTF) Operation and Performance (i) Based upon pertinent literature reviewed by staff, many sources (including API) do not recommend or atleast caution against a number of operating procedures, design features and monitoring parameters, etc., that are mentioned in the SEIS and/or final permit application appendices as follows:

60 (a) Oily waste loading rate should optimally range from o.5 to 2.0 percent (oil weight/soil weight) and not 6 percent or greater. Climate, soil and soil characteristics, waste characteristics, microbial suite, etc., will control the application rate;

61 (b) Optimally, soils should be a naturally occurring clayey loam to a silty, clayey loam with 3 to 4 percent organic matter, pH 6.0 to 8.0, Eh slightly oxidizing, high CEC, near field capacity, on slopes not to exceed 6 to 12 percent, etc. Since the soils will be composited and manufactured, they will lack the natural physical, chemical and biological structures which are often more difficult to quantify by test procedures but very significant in the overall capacity of a soil to assimilate and degrade oily waste.


PARTITION SCHEMATIC OF PROPOSED KOCH REFINING COMPANY'S LAND TREATMENT FARM (LTF)
AIR
MACROSCALE
MICROSCALE
SOIL
VADOSE ZONE
BEDROCK
EPI-PHREAS (W.T.)
PHREATIC ZONE
RCRA LTF
LOFTING, ETC.
FUMIGATION, ENTRAINMENT,
TRAPPING, POOLING, ETC.
DIRECT AIRBORNE RELEASE OF VOLATILE HC's DURING APPLIC.
≈30-60 MIN. POST-APPLIC. RELEASE OF VOLATILE HC's & DURING/AFTER SUBSEQ. TILLAGE
INDIRECT STEADY STATE RELEASE OF VOLATILE HC's (SOIL WETTING, DRYING, GAS VENTING
TREATMENT PROHIBITS AIRBORNE RELEASE
OIL
WATER
SOLIDS
SOIL
Lateral and Vertical Spreading Beyond Application Zone (≈15cm.)
DEGRADATION
PHYSICOCHEMICAL
BIOLOGICAL (AEROBIC & ANAEROBIC)
ADSORPTION
DILUTION
AIR/GAS EXCHANGE
SOIL PORES
FRACTURES
VACUOLES
ROOT & ANIMAL TRACKS
DESORPTION
DISSOLVED CONSTITUENTS
WATER SOLUBLE
OTHER SOLUBLE (OIL, HYDROCARBON FRACTIONS/METABOLITES)
ETC.
SUSPENDED CONSTITUENTS
COLLOIDS
EMULSOIDS
LIGANDS
ETC.
SETTLEABLE CONSTITUENTS
RESIDUAL SOLIDS
PRECIPITATES
BIOMAT
ETC.
BULK FLOW
VAPOR PHASE TRANSPORT
15cm Applic
Approx. 137.4 cm (4.5ft.) Buffer Zone
152.4 cm (5ft.) LAND TREATMENT FARM ZONE
TREATMENT PROHIBITS MIGRATION BEYOND LTF ZONE
WATER TABLE 40-60 FEET BELOW SURFACE
Qro
Osp
Opc
←SW
NE→

PARTITION COEFFICIENTS FOR PHYSICALLY, CHEMICALLY & BIOLOGICALLY MEDIATED PHASES IN OILY WASTE DEGRADATION



STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

BOX . 500 LAFAYETTE ROAD • ST. PAUL, MINNESOTA • 55155-40_____

DNR INFORMATION
(612) 296-6157

March 17, 1988

Ms. Marlene Voita
Office of Planning and Review
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

RE: Koch Refining Company Draft Supplemental Environmental Impact Statement (SEIS)

Dear Ms. Voita:

The Department of Natural Resources (DNR) has reviewed the above-referenced document, and we offer the following comments for your consideration.

In general, the draft Supplemental EIS adequately addresses the issues raised in the Scoping EAW. As stated in the EAW, the main impact on fish and wildlife resources is the loss of 40 acres of brush/grassland. We suggest that the closing of the landfill, which is not discussed in detail in the SEIS, could offer an opportunity to mitigate for the loss of habitat.

The SEIS does not say whether any new production wells will be needed for the project. A DNR permit is not needed unless new wells are constructed to appropriate additional waters. We suggest that gray water from the wastewater treatment plant be used if practicable.

62 We are concerned about the location of the discharge near Spring Lake, which has been proposed for restoration. We recommend that the impact of the discharge on Spring Lake be evaluated.

Thank you for the opportunity to review this SEIS. If you have any questions about our comments, please call Don Buckhout at (612) 296-8212.

Sincerely,

Thomas W. Balcom

Thomas W. Balcom, Supervisor
N.R. Planning and Review

#880004-2

cc: Kathleen Wallace
Ron Lawrenz
Laurel Reeves
Gregg Downing, EQB
Robert Welford, USFWS
James Thomas Segar

Metropolitan Council
300 Metro Square Building
Seventh and Robert Street
St. Paul, Minnesota 55101

Telephone (612) 291-6359

March 18, 1988

Marlene Voita
Office of Planning and Review
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

RE: Draft Supplemental EIS, Koch Refining Company
Proposed New Land Treatment Facility in Rosemount
Metropolitan Council Referral File No. 14231-2

Dear Ms. Voita:

I am sending you (enclosed) the Council staff comments on the proposed land treatment facility at the Koch Refinery in Rosemount.

The staff comments have been recommended by two Council advisory committees for approval by the full Metropolitan Council on March 24, 1988. A formal response following that action will be forwarded to you.

If you have any comments or questions, I can be reached at 291-6381.

Sincerely,

Robert Overby

Robert Overby
Planner

Attachment

Metropolitan Council of the Twin Cities Area
300 Metro Square Building, 7th and Robert Streets
St. Paul, Minnesota 55101 Tel. 612 291-6359/TDD 291-0904

DATE: March 11, 1988

TO: Metropolitan and Community Development Committee

FROM: Long Range Planning Program (Robert Overby)

SUBJECT: Draft Supplemental Environmental Impact Statement
Koch Refining Company
Proposed New Land Treatment Facility in Rosemount
Metropolitan Council District 16
Metropolitan Council Referral File No. 14231-2

The Koch Refining Company has proposed a new land treatment facility to allow the refinery to continue to treat on-site each year approximately 18,000 tons of hazardous wastes generated by the operation of the refinery. The proposed new treatment facility will be located at the company's refinery complex in the Pine Bend Industrial District in the City of Rosemount, Minnesota.

Alternative 1 - The proposed new land treatment facility (landfarm). The active area will be 30 acres in size and is intended to replace the existing landfarm facility. The facility will be located immediately south of the existing land treatment facility (see attached site maps). A separate solid waste treatment area will be located nearby. The estimated lifetime of the facility is 30 years. Post-closure care would continue for 30 years after, and include groundwater monitoring and maintenance.

There are six other alternatives to Alternative 1:

Alternative 2: Land treatment at the new unit, with minimization of waste (de-watering prior to land treatment).
Alternative 3: On-site waste minimization, off-site land treatment.
Alternative 4: On-site waste minimization, off-site landfilling.
Alternative 5: On-site waste minimization, treatment, and landfilling.
Alternative 6: On-site waste minimization, off-site incineration.
Alternative 7: On-site waste minimization, on-site incineration, ash treatment, and on-site landfilling.

Under Minnesota Environmental Quality Board (MEQB) regulations, the project requires the preparation of an Environmental Impact Statement (EIS).

AUTHORITY FOR REVIEW

MEQB rules require a public scoping process for any EIS. The scoping process is used to reduce the scope and bulk of an EIS; to define the form, level of detail, content, alternatives, and timetable for preparation of the EIS; and to determine the permits for which information will be developed, concurrent with the EIS. The rules further state that an EAW will be the basis for the scoping process.

A public scoping process was implemented prior to the preparation of this draft supplemental EIS. The Minnesota Pollution Control Agency (MPCA) prepared a scoping environmental assessment worksheet (EAW), published the hearing notice, and adopted a scoping decision document on August 25, 1987. The MPCA is the responsible governmental unit (RGU) for this project.

ANALYSIS

The primary concerns raised in the EAW for the project were:

1. the potential for surface water contamination due to the proposed project and alternatives;
2. the potential for groundwater contamination in the wells of nearby residents and the City of Inver Grove Heights wells from the proposed landfarm;
3. the potential for an increase in odor impacts at nearby residences due to the proposed landfarm;
4. comments on alternatives to be included in the Supplemental EIS; and
5. comments pertaining to concerns with the existing landfarming operating and monitoring practices.

Natural Resources (Gary Oberts)/Solid Waste (John Rafferty)

63 The supplemental EIS was reviewed for its potential impact upon ground and surface waters. The largest concern raised by the staff review involved verification. The theoretical information presented on the movement of ground water and on the impact of discharges into the two water systems needs to be verified carefully, once the treatment system is operable. Of particular concern is the level of carcinogenic polynuclear aromatic hydrocarbons (CPAHs), as represented by Benzo[a]Pyrene (B[a]P). The theoretical detectable concentration of B[a]P is very close to the Minnesota Department of Health Recommended Allowable Limit (RAL) for drinking water. Although this level is currently below the level of detection, the analysis indicates that a potential release of carcinogenic material could occur. Careful monitoring of the CPAH family of chemicals should occur, as instrumentation available to detect the chemicals improves. Such a monitoring approach was not detailed in the supplemental EIS, although some mention was made of the need for monitoring. Development of the monitoring approach specifics would enhance the supplemental EIS and answer questions in the minds of the reviewers about what the future might bring, should leachate concentrations change.

64 Equally important to the above analysis is the verification of the manner in which groundwater moves under and away from the site. Preliminary indications are that the movement of groundwater is generally east and northeast, toward the Mississippi River. It is assumed that the monitoring program will be based upon previously collected data from monitoring wells W1 through W16. The major controlling factor in regional groundwater movement is the bedrock valley that cuts into the Franconia formation. This valley occurs on the opposite end of the Koch Refinery property from the new treatment facility. Therefore, it is imperative that exact movement of groundwater is known in order to assure that small, localized flow patterns typical of glacial drift geology do not exist in the area. Such small deviations in the local flow patterns could serve to divert water toward residential groundwater users, who are thought to be upgradient of the treatment facility.

65 The final area that verification would serve is the operation and subsequent treatment of discharges from the surfacewater runoff pond. Again, a fair amount of theoretical calculations has gone into the design and expected operation of this part of the facility. Unusual rainfall events, such as back-to-back rainfalls of a low reoccurence interval or very large amounts of precipitation, do occur. provision should be made for operational contingencies, should unexpected weather conditions dictate a change from normal procedures.

The draft supplemental EIS addresses the primary concerns raised at the public scoping meeting. However, better information should be presented on the follow-up monitoring program, in order to assure that verification of the theoretical information presented will occur. Specifically, information should be presented on:

1) the frequency and method of collection of CPAH sampling;
2) the details of determining the movement of groundwater away from the vicinity of the new treatment site; and
3) contingency measures to be taken in the event that unusual rainfall conditions threaten the structural and operational integrity of the surfacewater runoff holding facility.

Metropolitan Development and Investment Framework (MDIF) (Robert Overby)

The proposed land treatment facility is consistent with the Rosemount comprehensive plan. The Koch refinery is situated on land that is zoned by the City of Rosemount for General Industrial land uses. The City has zoned the land bordering the refinery for agricultural land use density levels. The City's future land use plan calls for the entire eastern portion of Rosemount to remain dedicated to agricultural land uses, except for the Pine Bend Industrial Area. The City's land use plan for the year 2000 does not include this area in the metropolitan urban service area.

RECOMMENDATIONS AND CONCLUSIONS

That the Council adopt this report and its conclusions as its comments on the Koch Refining Company Land Treatment Facility Supplemental EIS.

1. The supplemental EIS addresses the primary concerns raised at the public scoping meeting.

2. Better information should be presented on the follow-up monitoring program in order to assure that verification of the theory presented in the EIS will occur. Additional information is needed on the following specific items:
   (a the frequency and method of collection of CPAH sampling;
   (b) the details of determining the movement of groundwater away from the vicinity of the new treatment site; and
   (c) contingency measures to be taken in the event that unusual rainfall conditions threaten the structural and operational integrity of the surfacewater runoff holding facility.

RO004

3.3 COMMENT LETTERS AND RESPONSES

(NOTE: Numbered responses correspond to the numbers noted in the margin on the comment letters.)

1. If the results of the land treatment demonstration (LTD) indicate that the assumptions used for the ground water impact analysis in the supplemental environmental impact statement (SEIS) are substantially different in comparison to those identified for the LTD, or a different alternative than that identified in the SEIS is selected, further review of the project may be necessary. This review can either consist of preparation of an SEIS for the project or any remaining environmental concerns could be addressed through the permitting process. If major changes to phase 2 of the MPCA facility permit (which authorizes construction and operation of the proposed land treatment facility) are necessitated by the results of the LTD, the proposed modifications are subject to MPCA public participation procedures.

   1a) The topics listed in comment 1a are presented in more detail in subsequent comments. Accordingly, these issues are addressed in response to the detailed comments and are also addressed in the final SEIS text. Issues relating to groundwater quality are addressed in response to comments 2, 5, 6, 8, 9, and 25. Leachate generation responses are found in responses 2 and 27. Construction and operational concerns are addressed in responses 3, 13, 37, 54, 60 and 61. Air quality modeling comments are addressed in responses 14, and 39-48.

   1b) Differences between the alternative most closely resembling the current version of the proposed project (Alternative 2) and the current version of the proposed project are outlined in comment responses 15 and 50 and also in section 2.1.1(d) of the final SEIS. The MPCA believes that the current version of the project is not significantly different than Alternative 2 in the draft SEIS.

   1c) The topic of an additional future SEIS is discussed in comment response 1.

2. Minnesota Rule 7045.0536 defines the permitting standards for a hazardous waste land treatment facility. In order for a facility to be permitted, it will be proven to the Agency's satisfaction that no hazardous constituents will migrate from the treatment zone. The intent of the SEIS is to identify potential impacts. For the purposes of the

SEIS, a conservative examination of the most toxic compounds is appropriate.

It is the purpose of the SEIS to provide a full and fair discussion of environmental impacts and to identify potential impacts of the proposed project and its alternatives using available information. For the purposes and applications of the Koch Refinery Proposed New Land Treatment Facility Supplemental EIS (SEIS), a simplified conservative approach was adopted to identify waste constituents that could leach out of the landfarm. Indicator chemicals were selected based on health risk criteria and other considerations (including concentration, volatility and mobility) to allow a uniform comparison across all six alternatives. The analyses performed were conservative. In response to this comment, several additional compounds were selected and evaluated in the same fashion. By selecting compounds with the greatest potential for movement from the treatment zone into ground water below or air above and evaluating them in a conservative manner, the potential impacts associated with Koch's listed organic compounds at a land treatment facility operation can be identified.

Phenol and methyl ethyl ketone (MEK) were also selected for analysis for the final SEIS because they have a high potential for mobility or persistence in the environment. As in our previous analyses, the following conservative assumptions were made to ensure that the resulting leachate concentrations were conservative. The major assumptions used are: 1) the water balance calculation for net percolation assumed that zero runoff would occur during the active land disposal period (April-October); only the top foot of the recognized five-foot treatment zone was utilized to provide treatment. (The leachate from the top foot was assumed to transfer directly to the aquifer below, ignoring the dilution/dispersion, degradation, adsorption or volatilization which could take place in the 40 to 90 feet of unsaturated deposits below the landfarm site); and 3) maximum concentrations of waste were utilized by evaluating a soil concentration equivalent to the application of an entire year's waste in one batch application. Calculations indicated no migration of phenols or MEK from the treatment zone (see Table 2).

A much more detailed modeling effort is normally conducted as part of the permitting process. Such a study is currently under way as the Koch Refinery Company develops results from its laboratory analysis of degradation rates and proceeds with its in situ land treatment permitting demonstration. The regulations for permitting a land treatment facility require that organic chemicals of

concern must not be detectable in the leachate and groundwater below the site. Therefore, our evaluation is based on simplified calculations which estimate a reasonable worst case situation which also provides data suitable to conduct a conservative health risk analysis so that upper bound risk values can be determined.

Our analysis is based on standard equations and conservative coefficients reported in the literature. The general methodology is to select a highest chemical loading/soil concentration and compare the time to degrade with the time to migrate out of the treatment zone. If the time to degrade is significantly less than the migration time, there is essentially no detectable contamination. The degradation time calculation involves three unknowns: initial concentration, final concentration and biodegradation constant. The migration time calculation involves the velocity of percolating water, the depth of treatment zone, bulk density of soil, porosity of soil, and the soil partition coefficient.

As shown in the API publication no. 4379, (1984) The Land Treatability of Appendix VIII Constituents Present in Petroleum Industry Wastes, t_d and t_m can be estimated as shown below.

$$t_D = \frac{\ln(c_t/c_o)}{-k}$$

where:

c_o = the concentration of a constituent in the soil (mg compound/kg soil) at time 0 (immediately after waste application and incorporation).

c_t = the detection limit concentration of the constituent in the soil at time t (mg compound/kg soil) based on EPA analyses techniques.

k = first order kinetic constant (day-1)

t_d = time to degrade constituent to a concentration c_t (days)

$$t_m = \frac{z}{v\ (1 + (\rho/n)(k_p)}$$

where:

z = depth of biologically active treatment zone (30.48cm)

V = velocity of water (2.18 cm/day)

ρ/n = bulk density of soil/porosity of soil (1.4 g/cm3)

K_p = soil water partition coefficient (ml/g)

TABLE 2-2

ORGANIC CHEMICAL FATE - ALTERNATIVE 2

	Initial Soil Concentration Co(mg/kg)	Ct (mg/kg)	k(a)	t_d Degradation Time (b) (days)	kp(a)	t_m Migration Time(c) (days)	t_m/t_d
Benzene	7.1	0.5	0.1	26.5	2.49	83.5	3.2
Phenol	0.89	0.5	0.69	0.8	6.50	218.	272.
MEK	23.8	0.5	0.69	5.6	1.67	55.9	10.0
B[a]P	27.4	10.	0.008	213	$1.35\ E^5$	$4.5\ E^6$	$2.1\ E^4$

(a) The values in the literature ranged approximately one order of magnitude. More conservative values were used to provide a more conservative estimate.

(b) Time to reach non-detectable level.

(c) Time to travel from the first foot (30 cm) of the treatment zone. These migration times are notably conservative because of the related infiltration assumptions in the water balance.

The reduction in constituent concentration is calculated solely as a function of biodegradation. Volatilization effects were not considered in these calculations. The inclusion of volatilization would; however, significantly lessen the time required to reduce the concentration of volatile constituents to background or below detectable levels. Thus adding a considerable safety margin.

It is clear that the calculated migration times required for movement from the first foot of the treatment zone significantly exceed the degradation times. In fact, the concentrations of benzene, toluene and xylene were so low after the time required for migration that leachate concentrations were essentially zero as shown in Appendix D of the draft SEIS.

Preliminary soil concentration calculations for the same constituents have been made using the following conditions:

- 150 day treatment seasons (approximately May 1 - September 30)

- 3 equal waste applications at 50 day intervals

8 inch (20.32 cm) zone of incorporation.

Results of the calculations are presented in Table 3. The calculations were based on equations and constants as used in Response 2 and Appendix D of the draft SEIS.

TABLE 3

ORGANIC CHEMICAL FATE - REVISED CONDITIONS

	Initial Soil Concentration C_o(mg/kg)	Ct	k	t_d Degradation Time (days)	Kp	Migration Time tm	tm/td
Benzene	3.47	0.5	0.1	19.4	2.49	55.7	2.9
Phenol	0.45	0.5	0.69	<0.1	6.50	6.7	134.
MEK	1.18	0.5	0.69	1.2	1.67	37.1	30.9
B[a]P	13.6	10.	0.008	38.4	1.35×10^5	3.0×10^6	7.8×10^4

The revised conditions resulting from these calculations did not exhibit any significant changes as compared to those calculated previously in the SEIS.

The MPCA has determined that metals have not migrated from the existing site. These results support our assumptions by indicating that soil conditions to date have been acceptable for binding metals. In a properly managed land treatment facility, conditions favorable to metal binding and retention can be maintained given adequate potential exists; however, to do so, proper operating conditions must be determined on a site-specific basis and proven through an on-site demonstration project. Further discussion is found in response number 9.

Tne interaction of partial degradation products is a complex scientific issue. The SEIS analyses were oriented towards the predominant chemicals known to occur in Koch's waste, although other chemicals are likely to occur as a result of site-specific degradation. Monitoring of the LTD could be designed to identify or quantify compounds generated as a result of partial degradation interactions if warranted.

3. The materials cited in the comment including the most recent groundwater and unsaturated zone monitoring data were submitted too recently to be completely evaluated and included in the draft SEIS. They have been included in

the permit application and are available for public review at the MPCA. The computer simulation was completed in February 1988. The field demonstration portions of the LTD have yet to be completed.

The current land treatment facility design has changed somewhat from the design available at the time of the analyses associated with the draft SEIS and it is likely to continue to evolve, particularly since the LTD phase will be a primary factor in the selection of the final design of the landfarm and its operating practices. Details of the current design are presented below. Additional details are provided in Permit Appendix AA: Design, Construction, Operation and Maintenance Report for Koch Refining Company New KRC Land Treatment Facility January, 1988. This report is on file at the MPCA.

Treatment Application Area:

Hazardous Waste Unit 1 (HW 1)	23 acres
Hazardous Waste Unit 2 (HW 2)	4.4 acres
	27.4 acres

(The final size will be determined from treatment capacities calculated from the LTD. The draft SEIS utilized 30 acres which is within 10 percent of the current plan.)

Waste Minimization:

Wastes applied to HW 1 will be dewatered (equipment and removal volume unspecified*).

Wastes applied to HW 2 will not be dewatered since initial water content is low.

* Draft SEIS assumes 50 percent water removal based on data from other refineries.

Application and Tillage:

The wastes are semi-solids and will be applied to the soil by a waste spreader. The soil will be immediately plowed by a moldboard plow to a depth of 12 inches. The area will be tilled by chisel plow seven to ten days later. The area will be tilled by chisel plow at a frequency of two to eight weeks. Waste application will be three times per year in HW 1 and once or twice per year in HW 2.

One annual loading is utilized in draft SEIS for all wastes.

Zone of Incorporation:
30 cm (12 inches)

The draft SEIS also used 30 cm zone of incorporation

Oil Loading Rate:

HW 1	2 lb/ft3/yr	- maximum per application
	5 lb/ft3/yr	- maximum yearly application
	1.33 lb/ft3	- average per application
	4 lb/ft3	- average yearly application
HW 2	3 lb/ft3	- maximum per application
	6 lb/ft3/yr	- maximum yearly application
	5 lb/ft3/yr	- average yearly application

Annual average oil loading data from the draft SEIS was calculated to range from 3.5 to 4.0 lb/ft3/yr. in HWI and 2.5 lbs./ft3/yr. in HWII assuming a 12 inch zone of incorporation.

4. It is true that the new LTF must have well designed monitoring systems for unsaturated zone and groundwater monitoring. The new LTF will have new downgradient monitoring wells and a new upgradient well. This monitoring system will be capable of detecting whether hazardous constituents are reaching the groundwater from the new land treatment facility.

5. Recent calculations made, using a 150 day treatment/application season, rather than a 214 day treatment/application season, continued to support the draft SEIS conclusions that the biodegradation processes would still reduce concentration levels to acceptable

levels. This additionally conservative approach implies that potential low-temperature impacts would not be significant. See Table 2-3 in the Final SEIS Section 2 and Table 3 in the response to comment 2.

Studies done on biodegradation vs temperature (Hazardous Waste Land Treatment, Brown, et. al 1983) have shown that biodegradation effectiveness was reduced from 40 percent at 20 degrees C to 20 percent at 10 degrees C. Biodegradation has been shown to continue down to 5 degrees C. This temperature reduction still allows for some treatment to continue at these lower temperatures though at a lower rate.

Soil temperature variations, while influencing the biodegradation raates, did not prove to have a major overall impact. The degradation times of the wastes were significantly less than the applicable migration times indicating a considerable safety factor. These safety factors as expressed by migration/degradation time ratios effectively nullified any potential negative impacts due to reasonably reduced degradation effectiveness that may be attributable to temperature effects.

As cited in Hazardous Waste Land Treatment (Brown, et.al 1983) and shown in the Figure A, although biodegradation's role in waste treatment is approximately halved or quartered (40% to 20%) with the decrease in soil temperature from 20 degrees C to 10 degrees C, a notable level of biodegradability still remains.

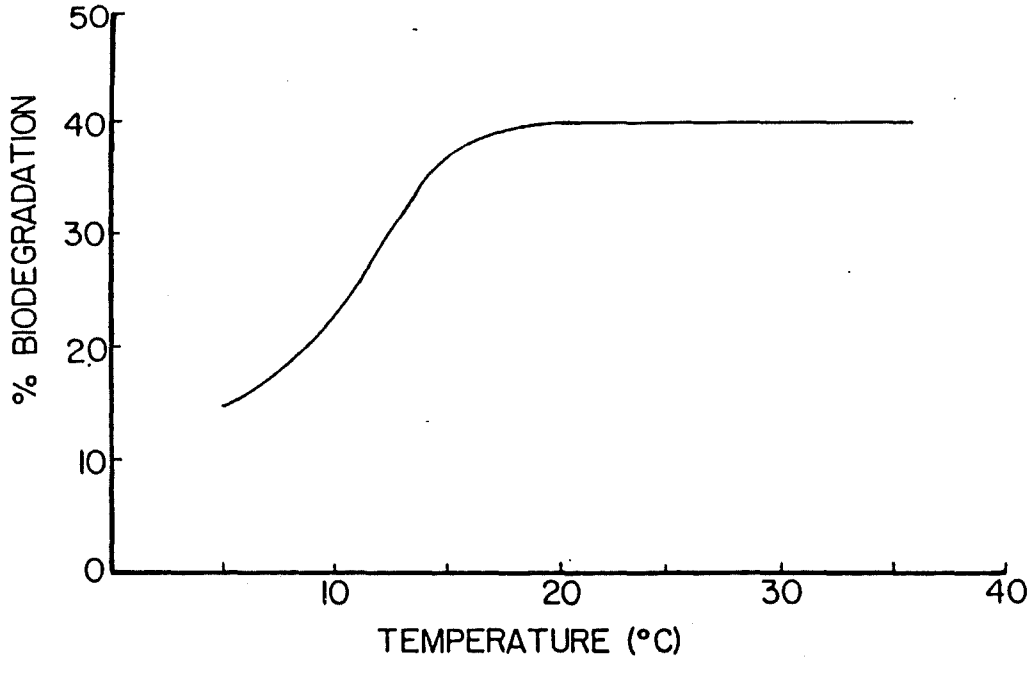
Dibble, J.T. and R. Bartha. Effect of Environmental Parameters on Biodegradation of Oil Sludge. Appl. Environ. Micro. 37:729-738. 1979. in Brown et. al. Hazardous Waste Land Treatment. Butterworth. 1983.

6. The selection of chemicals for analysis in the draft SEIS is addressed in response to comment #2.

7. When applications of waste are made to a land treatment facility, the concentrations accumulating in the soil reach an equilibrium condition. An example for benzo-a-pyrene (B[a]P) is outlined below.

When applications are made every three days, the equilibrium soil concentration of about 16mg/kg is reached after approximately 48 application periods (towards the end of the second year of application. A concentration of 16 mg/kg is only approximately 60 percent of the concentration of 27.4 mg/kg utilized in the analysis. Thus, by comparison, there is a considerable safety factor.

FIGURE A



Effect of temperature on hydrocarbon biodegradation in oil sludge-treated soil (Dibble and Bartha, 1979). Reprinted by permission of the American Society of Microbiology.

A second scenario was also considered utilizing 150-day treatment seasons with three sets of applications (every 50 days). This was done to address questions of possible temperature limitations and mechanical overworking of the soil. Benzo-a-pyrene soil concentrations were calculated for the 150-day treatment seasons considering degradation effects only. No degradation was considered beyond the 150-day season. With these extremely conservative assumptions, equilibrium B[a]P soil concentrations were shown at approximately 18 mg/kg, or 66% of the original concentration 27.4 mg/kg utilized for analysis in the draft SEIS.

Other organic constituents including benzene, phenol and MEK were analyzed utilizing this set of conditions. These other compounds continued to show a nondetectible residual soil concentration and no detectable concentrations in leachate (see also response to comment 2).

8. The calculations used to determine leachate quality in the draft SEIS do utilize a Henry's Law constant that reflects water-air volatilization. A modified Henry's Law constant can be used to describe the equilibrium partitioning of a chemical in the oily waste between the oil film and the vapor space in the soil. The appropriate units for this modified Henry's Law constant would be cc oil/cc air. Dupont (1986) suggests that this modified Henry's Law constant is the ratio of the actual Henry's Law constant (cc water/cc air) and the solvent water partition coefficient, K_{SW}, for a particular chemical. When the modified Henry's Law constant (K_1) is used in the calculation of the volatilization mass transfer coefficient, at 20 degrees C, as shown in Appendix D, the resulting value is about one order of magniture smaller than the value calculated with the actual Henry's Law constant. The volatilization rate constant, K_V, calculated from the smaller K^1 value is also about one order of magnitude smaller. However, when the smaller K_V value is used to calculate the concentration of a chemical in the soil at the directed treatment intervals, the result is still zero. A more complete discussion of these results is presented in the response to comment 2.

9. The MPCA evaluation of the referenced 1987 groundwater monitoring data does not indicate the presence of metals above groundwater protection standards. The analysis results indicate no barium concentrations above standards. The one occurrence of cadmium concentrations over standards is probably attributable to laboratory or sampling error since there was no other incidence of high cadmium levels in this particular well. While mercury concentrations were high in three wells immediately after installation in 1984, concentrations have been much lower than subpart 7

limits for all subsequent monitoring periods. Concentrations of selenium are higher than federal maximum contamination levels in background wells, and though concentrations in monitoring wells were higher than standards, the levels were less than the Minnesota Department of Health recommended allowable limit (RAL) of 45 ug/L.

The nature of the soil micro-chemistry involving metals is extremely complex. The coordination chemistry taking place in micro-environments and the multi-variable conditions which affect these reactions indicate that the best practicable approach is to monitor in situ for metals leaving the treatment zone rather than studying the micro-environment.

The MPCA has determined that metals have not migrated from the existing site. These results support our assumptions by indicating that soil conditions to date have been acceptable for binding metals. In a properly managed land treatment facility, conditions favorable to metal binding and retention can be maintained given that adequate potential exists in the soil. However, to do so, proper operating conditions must be determined on a site-specific basis and proven through an on-site demonstration project.

Further study of the existing land treatment facility may provide more detailed information about the specific metal-binding capacity of the proposed facility. An analysis comparing total metals with its component dissolved and total suspended metals would provide important information about metal binding capabilities.

10. As discussed previously, in response to comment 9, the highly complex and variable nature of the soil environment makes a multitude of different scenarios possible for metals. Although the reducing conditions on a micro-scale under a small change in pH may have the potential to occur, its actual probability is unknown. Data collected by the MPCA from the existing site demonstrate that such conditions, if they occur at all, have not resulted in unacceptable releases of metals or any other materials from the site.

    If warranted, further study of the existing land treatment facility or the demonstration site, may provide more detailed information about the variability in redox condition and dissolved oxygen concentrations which could conceivably influence the fate of waste components.

11. Information and materials have been provided to those requesting additional information. The technology of waste treatment and disposal is developing at a rapid rate. The number of personal communication sources are primarily related to an effort to acquire associated current cost cost information and waste incineration and treatment information. The scope of the EIS is limited to available information. Whenever possible, efforts were made to verify the information furnished by Koch Refinery or its consultant.

12. Peer review comments are addressed in response to comment 11.

    The leachate quality study done in the SEIS is not based on an ICF-Clement paper (Inhalation Exposures to VOCs in the Shower) but rather uses several equations presented in this paper that can be used to describe the mass transfer of chemicals across an air:water interface. The appropriate cites in the leachate quality analysis should have been the primary references cited in this paper. The mass transfer coefficients in the leachate quality analysis were derived using equations presented by Liss and Slater ("Flux of Gasses Across the Air-Sea Interface". Nature 247:181-184, 1974). The estimated mass transfer coefficients could be adjusted to different temperatures using an equation presented by O'Connor and Dobbins ("The Mechanics of Reaeration in Natural Streams". J. Sanit. Eng. Div. ASCE 82:SA6. 1956).

13. The existing topography and soils of the new land treatment facility site are shown in Figures 2-3 and 2-4 in Section 2 of the final SEIS. Essentially, the site is divided diagonally northeast-southwest by a 10 to 15 percent slope which drains to the north. The slope and the hill to the southeast will be graded as shown in Figure 2.2-2 from the draft SEIS (included in Section 2 of the final SEIS as Figure 2-2). Approximately 17 acres including at least 12 acres of hazardous waste unit 1 would require soil restructuring. The LTD site will also be constructed on rebuilt soils.

    Specifications for the reconstructed soil will be determined to develop a soil similar to Wadena loam. Specifications will include depth of soil layers, gradation, pH, cation exchange capacity, and organic content. Proposed specifications are presented in Table 2.3-1 of Appendix AA: Design, Construction, Operation, and Maintenance Report for the New Land Treatment Facility January 1988. This report is on file at the MPCA.

14. Issues regarding the appropriateness of the model used to evaluate volatile emissions are addressed in responses to comments 35, 36, and 39-48.

15. The current version of the proposed land treatment facility description is outlined in response 3 and Section 2 of the final SEIS. This version does not significantly differ from that analyzed in the draft SEIS and the Agency believes the SEIS analyses are valid for their intended purposes. The proposed project will continue to change through the completion of the LTD as will the analyses of related data. The purpose of the LTD is to identify final design changes to ensure that the permitted facility is properly constructed, operated and monitored; to prove that specific practices will work in situ. The LTD must demonstrate that the rules in Chapter 7045 governing land treatment can be complied with.

15a. The predicted leachate leakage from the landfill is not the result of improper design criteria; but rather, is due to limits in the capabilities of the model used to perform the liner leakage analysis and the conservative nature of the evaluation.

The hydraulic performance of the landfill leachate collection and liner system was evaluated using a model developed by Wong (1977) and modified by Kmet, et al. (undated). The equations of the model are presented on pages 3-118 through 3-121 of the draft SEIS. The use of this model was discussed and approved by the MPCA staff. The model takes into account many variables including liner thickness, hydraulic conductivity of the liner, and the height of the saturated volume on top of the liner (head). The model assumes that given a slug of liquid placed upon a liner, a portion of the liquid will drain off (be collected and the remaining portion will pass through the liner. Hence, the principal output of the model is the percent leakage through a liner for a given head.

As currently developed, and assuming all other variables are held constant, when the head is decreased, the model predicts that the percent leakage through the liner increases. As illustrated in Appendix C, Item H of the draft SEIS.

Thus, even with a properly designed leachate collection and liner system, it is possible for the model to predict leakage. This problem was discussed with the MPCA staff to determine if the model was adequate for the purposes of the SEIS. It was determined that a better model was not known to exist, and since the model predicts a greater leakage than what might actually occur, it was decided that

the model was suitable for the purposes of predicting worst case leakage conditions for the landfill.

In conclusion, the apparent leakage predicted for the landfill is the result of limits in the model utilized for the liner leakage analysis. The leachate collection and liner system as proposed are in full compliance with the regulations and guidelines for a hazardous waste landfill as set forth in CFR 264.301 and Minnesota Rules 7045.0538, subpart 3. Therefore, additional study of the landfill design is not warranted for the final SEIS.

16. Monitoring well data which were unavailable for the draft SEIS have been included in the facility permit application and are available for review at the MPCA. The MPCA staff see no significant variation in these data from past monitoring data.

17. The criticism is a valid one. In the past it was a routine practice to field filter water samples and test only for dissolved metals. The only exception to this standard operating procedure was in the case of drinking water wells where total metals were tested on unfiltered samples.

    To resolve this concern, MPCA staff will recommend that testing of filtered samples and unfiltered samples from the wells and lysimeters be required as part of the land treatment verification study. This will not include all the wells in the system, but it should provide enough information to determine if this mechanism of pollution partitioning is significant. Based on this information, the MPCA will decide whether to require this dual monitoring as part of the phase 2 permit.

18. As discussed earlier (Response 9 and 17), the complex nature of metal interactions makes it difficult to predict soil micro-environment conditions with reasonable confidence. Data reviewed by the MPCA indicates that metal solubilization and transportation has not presented a serious environmental issue at the existing facility. Further study, if warranted, may be conducted on the on-site demonstration project to address any additional concerns as to metal transportation out of the treatment zone.

19. Chloride and sodium were selected as potential indicator parameters representing the "miscellaneous inorganic" class. This selection was due to their elevated concentrations in the wastes and high migration potential. The transport of other inorganics is presumed to proceed at lower rates than either sodium or chloride. Nitrate transport may be of environmental concern, but its occurrence in wastes was low and sporadic.

20. Responses to comments regarding the validity of calculations of environmental fate of organic compounds are presented in response 2 and other responses. Response 2 includes an evaluation of phenol and methylethyl ketone.

21. The issue of initial calculations is addressed in response 7. The use of a 30 cm (1 foot) zone of incorporation is addressed in response to 18.

22. The issue of oil:air rather than water:air partitioning is addressed in response to comments 2 and 8. Hazardous waste unit I (HWI) was not treated differently from hazardous waste unit 2 (HWII) because of conservative assumptions used in modeling.

    The landfarm modeled in the SEIS was composed of six cells. Five cells would receive high oil content wastes on a regular basis, with the remaining cell receiving wastes with a high solids content. The emissions of volatiles from the single cell receiving wastes with a high solids content was far less than volatile emissions from the other five cells. However, when modeling ambient air concentrations associated with the volatile emissions from the entire landfarm (all six cells), it was assumed that the higher volatilization rates for the five cells with high oil content wastes would also occur across the remaining cell. The conservative nature of this assumption should result in an upper-bound estimate of the ambient air concentration associated with emissions from the proposed landfarm.

23. As discussed earlier (see Response 5), although not occurring at optimum rates, biodegradation of organic components will occur at low temperatures. Analyses have demonstrated that even in the absence of biodegradation, selected volatile organic (VOC) indicators were reduced to low levels by other compound processes (e.g., soil absorption, volatilization). Therefore, there is a considerable safety factor for regarding the role of biodegradation in the treatment of these wastes.

24. The metabolic pathways used by the indigenous microflora in the degradation of the various waste components is not well understood. The potential for the accumulation of toxic or less-degradable by-products although real, is beyond the scope of this project. The feasibility of further study providing insights into particular partial degradation processes is questionable, given the extent of current knowledge in this field. The ecology of the indigenous microflora is not well understood.

    The production of intermediate degradation products is addressed in response to comment 2.

25.- The groundwater analyses were conservative in that the
28. leachate from the first foot of the treatment zone was directly transferred to the aquifer below ignoring the dilution/dispersion, degradation, adsorption or volatilization which could take place in the 40 to 90 feet of unsaturated drift deposits below the landfarm site. The concentrations at this point were then used to evaluate health risks in a conservative fashion.

Detailed groundwater modeling of constituent movement in the unsaturated zone or aquifers was not within the scope of the SEIS.

The modeling analyses that were conducted used waste components identified as having the highest potential for persistence and transport. These factors included high water solubility, low adhesion to soils, and low volatility. It was, therefore, assumed that other waste components would exhibit a lesser potential for migration.

29- It was assumed that the transport of dissolved waste
30. components would greatly exceed that of either bound, chelated or adsorbed forms. The prediction of the transport of representative waste components out of the treatment zone was conducted considering only the dissolved phase. Although other phases may develop in the soil, such as those chelated or adsorbed to suspended matter, the rate of migration of the waste component in these other phases is assumed to be lower than in the dissolved phase. This assumption is made based upon the inverse relationship between mass and dispersion. Therefore, the dissolved component will have a shorter residence time within the treatment zone. Because the transport of the dissolved component was demonstrated to result in concentrations within of acceptable limits, (i.e. treatment time was adequate) treatment in the other phases was also assumed to result in acceptable levels.

31. Volatile aromatic hydrocarbons will volatilize from the treatment zone and will degrade in the treatment zone. Existing information indicates that volatile aromatic hydrocarbons will not migrate out of the treatment zone as leachate nor enter the groundwater.

32. The migration of volatiles from the treatment zone to the water table in vapor form was not considered to be a pathway for significant amounts of the chemicals.

33. As discussed earlier (see responses 2, 9, 17, and 18), the transport of metals has not been identified to present an environmental concern at the existing site. This issue may be addressed in the on-site demonstration project if warranted by future data.

34. The transport rates of phenol and MEK are greater than B[a]P and many other semi-volatile compounds. However, degradation time within the treatment zone was still adequate to bring the concentrations of these compounds well below their detection limits. Hence, no additional impacts were detected as covered in response to comment 2.

35. The purpose of the emissions modeling in the SEIS was to provide a means of comparing several waste management alternatives. While it is true that the primary emissions from a landfarm have a very short period (less than one hour) where the emissions rates are much greater than the average emission rate, the average emission rate provides a much better means of comparing the various alternatives particularly with regard to health effects. The average emission rate is the result of integrating the time dependent volatilization rate equation over a specified period. Thus the short term high emission rates are used in the calculation of the average.

36. Soil characterization is addressed in the response to comment 13.

Soil zone of incorporation is addressed in the response to comment 21.

Volatilization from the oil waste component is addressed in the responses to comments 8 and 22.

The model used for estimating volatile emissions from a land treatment facility was developed by Dr. Ryan DuPont at Utah State University, an independent and nationally recognized expert in land treatment of petrochemicals. This model is based on his published work including laboratory and field verification. The model assumptions were reviewed prior to its application, thus the best practicable approach was utilized in this analysis.

The assumptions used in the emissions modeling were necessary in order to make the modeling problem tractable. Comparisons in the literature of modeled emission rates with field measurements show very good agreement. In most cases the idealized model results overpredict the measured emission rates.

The effects of uniform application of wastes and the prevention of anaerobic conditions via soil aeration (i.e. plowing, etc.) are two components of a much larger issue, proper land treatment facility operation. The potential adverse impact of these issues can only be overcome through the identification, description and implementation of proper operation practices. This issue is discussed in greater detail in Section 2 of this document.

37. The waste application practices modeled represented the proposed Koch landfarm management practices at the time emission rates were calculated for the draft SEIS. The 150 day half-life for oily wastes was obtained from a personal communication with Dr. Ryan Dupont who has conducted experiments using oily wastes from the Koch refinery. For discussion of modeling assumptions, see response to comment 22.

38. The purpose of the SEIS was to provide a screening analysis which would allow for comparison of several waste management alternatives. There are no health criteria for evaluating exposure to total hydrocarbons and chemical and physical parameters vary among hydrocarbon compounds. Thus, emissions modeling would have to be done on a chemical-specific basis. This type of modeling is unwarranted for this level of analysis.

39. The MPCA as a regulatory agency utilizes U.S. Environmental Protection Agency (USEPA) approved dispersion models for regulatory review. Regardless of inherent model limitations, these models generally reflect state-of-the-art procedures. Since the MPCA is not a research center, it does not develop site-specific models to examine unique dispersion patterns. In general, the routine procedure is to perform dispersion modeling to predict hourly concentrations using 5 years of meteorological data per federal modeling guidelines. Since this approach satisfies stringent U.S. EPA requirements for protecting National Ambient Air Quality Standards (NAAQS), it should be adequate for SEIS purposes when comparing different waste alternatives, too. Accordingly, dispersion modeling for the proposed new land treatment facility at Koch Refining Company utilizes the USEPA approved Industrial Source Complex (ISC) model for regulatory review and planning purposes.

    The question of whether rural or urban dispersion coefficients best describe atmospheric turbulence near Koch Refining Company remains unanswered. Historically, urban dispersion coefficients have been used because they better protect the environment. Furthermore, several screening studies comparing model results with monitored data have shown urban dispersion coefficients better fit observed data in the Pine Bend area, especially in areas prone to high concentrations. Rural dispersion coefficients tend to underestimate monitored concentrations. Finally, USEPA has required Koch Refining Company to perform a model comparison study to demonstrate that setting emission limitations based on rural dispersion coefficients will still protect National Ambient Air Quality Standards (NAAQS).

40. The 1973-1977 meteorological data base has been used in previous dispersion modeling in the Pine Bend area. Since USEPA models do not consider precipitation, extended periods of wet or dry weather do not affect model concentrations. Furthermore, USEPA has performed studies with more than 5 years of meteorological data, and has concluded that modeling with 5 years is sufficient to protect NAAQS.

41. Thermal inversion trapping is considered in the ISC model via mixing heights at St. Cloud - the nearest National Weather Service. Episodic air pollutions events (plume fumigation, scavenging, etc.) are not routinely considered in regulatory review and planning purposes. Such consideration is generally possible only with a dense network of meteorological monitoring. This type of information does not exist in the Pine Bend area or elsewhere in Minnesota. Since USEPA models do consider wind speeds as low as 1 meter per second, which approach calm conditions, light wind conditions under steady-state conditions together with a dense model receptor grid tends to compensate for the model's inability to consider special episodic events.

42. Because urban dispersion coefficients reflect greater atmospheric turbulence than do rural dispersion coefficients, the cumulative turbulence due to topography and building wake effects is considered albeit indirectly.

43. The intended application of USEPA short-term dispersion models is for time periods ranging from 1 to 24 hours. Emission releases less than 1 hour may be better described by "puff" models, however, their application requires additional information (e.g. time-dependent emission releases and site-specific meteorological data) not available for this review. Therefore, various waste alternatives were reasonably considered and qualitatively compared in a manner consistent with available information.

44. Dispersion modeling was performed for 1-hour, 3-hour, and 24-hour averaging periods using a unit emission rate of 1 gram/second. This approach allows the calculation of downwind concentrations for any emission rate. For averaging times less than 1 hour, extrapolating 1-hour results may be necessary; the cumulative impact of multiple short-term episodes may require integration over time. Generally speaking, 1-hour model concentrations provide sufficient insight for shorter averaging times.

45. With respect to an area source emission release height of either 0 meters versus 1 meter above ground level, model results are not expected to be significantly different.

The assumption of a 1 meter release height is intended to account for the initial effects of surface roughness.

With respect to using an area source emission temperature of 0 degrees Kelvin, the model ignores temperature for area sources and consequently it has not effect on model results. Therefore, temperature should be disregarded.

Since the model uses hourly (60-minute) values and not 2-minute averages, the proper meteorological data was applied.

Applying a 1 gram/second emission rate was intentional so that the downwind concentrations from various pollutants at various emissions rates could be easily determined (via scaling) from a single modeling analysis. A unit emission rate was never intended to be representative of a specific pollutant (e.g. volatile hydrocarbons).

46. The intended application of the single modeling analysis is limited to conditions assumed by the model (i.e. steady-state, non-reactive, no decay, and no deposition). Obviously, model results become increasingly questionable as terms deviate from theses conditions. Generally speaking, the model assumptions used in the modeling analysis are reasonable first approximations when attempting to consider multiple situations in a single modeling analysis.

The topic of emissions for modeling of site-specific topography is addressed in response to comment 39.

47. The memo from Dennis L. Becker to J. David Thornton dated November 23, 1987, misstates the time periods modeled for both the landfarm and the landfill. The correct time period for the landfarm is from April 1 to October 31. The correct time period for the landfill is from January 1 to December 31.

48. In addition to modeling the entire landfarm and the entire landfill, individual landfarm cells and landfill cells were modeled separately. Modeling individual cells separately allows for the possibility of considering different scaling factors on a cell-by-cell basis. Therefore, a non-uniform spatial distribution may be considered by multiplying each cell by its appropriate scaling factor and summing over cells.

49.- 50. The SEIS presents a full and fair evaluation of environmental impacts associated with the proposed project and its alternatives and complies with the scoping decision. The proposed project does not differ significantly from the current version. Adequate opportunities for public comment

will be provided to address any subsequent changes in the project through an additional environmental document to follow the LTD or through the public comment input to the permitting process. Additional information about the SEIS study was and will be provided to those who requested it.

51. The scope of the SEIS did not include a thorough analysis of the existing land treatment facility. The waste management practices at the new land treatment facility will differ significantly from those at the existing facility because there will be less tillage, no winter application of waste, promotion of run-off, control of hydraulic loading, and waste segregation. While the operation of the existing facility is not directly applicable to the new facility for these reasons, further study of the existing facility would be of some use in establishing operating procedures for the new facility.

52. The EPA is studying the issue of volatile emissions from land treatment facilities, and may issue regulations on those volatile emissions at some future date.

52a. The shortcomings of a one year field verification study are counterbalanced by the environmental benefits of expeditiously closing the existing hazardous waste landfarm and complying with the requirements of the 1984 ammendments to RCRA to phase out existing hazardous waste units by issuing permits for units that fully meet RCRA standards.

53. The environmental analyses of all alternatives complies with the scoping decision. These analyses have the same level of certainty as those of EISs done for other projects. In addition, a supplemental EIS may be prepared if another alternative (other than landfarming) is selected.

54. The one year field verification study is likely to provide useful information about the effectiveness of land treatment under actual field conditions. If the results of the field verification study, in conjunction with the laboratory waste treatability studies, computer simulations, and scientific literature, do not make an adequate demonstration, then the MPCA would not approve construction and operation of the new land treatment facility (LTF) under phase 2 of the draft permit. At that point, continuation of the field verification study would be considered.

55. The success or failure of the existing LTF is not required to be established by the SEIS. The existing LTF is required to meet Interim Status Standards (which does not have the prohibition on hazardous constituent migration below the 5 foot level) while the new LTF is required to meet the

Facility Standards for final permitted facilities which includes specifications for a 5 foot level.

56. Any oils that have penetrated into the subsoils of the existing LTF will be removed, treated, and capped during closure of the existing LTF.

The shallower tillage and other improved design and operation conditions at the new LTF are expected to prevent migration of oil from the treatment zone.

The new LTF will have the better, pan design lysimeters while the existing LTF has vacuum lysimeters.

57. The 1984 Consent Agreement between the U.S. EPA and Koch required the installation of new wells which met RCRA standards. They have yielded comparable data. It is standard practice to filter water samples, but analysis of unfiltered samples can be done. It is a basic fact that no area has uniform hydrogeology, and all groundwater data has to be interpreted in view of the local hydrogeology at the facility. Detailed groundwater modeling is not within the scope of this SEIS. The simplified groundwater loading assumptions that place contaminants directly from the top foot of the treatment zone into the aquifer provide a worst case situation for health risk assessment.

58. There will be no effect on unsaturated zone monitoring, and no pervasive effect on groundwater monitoring for the new LTF.

Tne MPCA does not have a prima facie objection to manufactured soils, as long as they are properly specified and the land treatment demonstration is done on soil representative of the manufactured soil. Contaminated water from the proposed facility will not be directed to low lying areas located southeast and northeast of the site.

59. The laboratory studies and field verification study will be done on manufactured soil, and will demonstrate whether the manufactured soil achieves effective treatment. (see also response to comment 58).

60. The land treatment program portion of the permit application addresses the issue of oily waste loading rate.

61. See response to comments 58 and 59 regarding reconstructed soils.

62. The location of the discharge is near Spring Lake, which has been proposed for restoration. The impact of the Koch discharge on the Mississippi was evaluated by MPCA staff in a 1981 waste load allocation. The conclusion of that study was that the Koch discharge did not have to be more rigorously controlled than the state's minimum treatment requirements in order to maintain existing water quality standards.

    Another potential development that may reduce any potential impact by the expanded discharge is the proposal to dike off the northern end of Spring Lake. In this case Koch's discharge would no longer enter the lake except during severe flooding conditions. Finally, the proposed increase in the discharge related to any of the SEIS alternatives is not sufficient to change the conclusion of the 1981 waste load allocation study.

63. B[a]P and other CPAHs will be monitored in groundwater from groundwater monitoring wells immediately downgradient of the facility on a quarterly basis, in leachate from lysimeters located in the soils below the treatment zone on a three times per year basis, and in soil borings made at the facility on a semiannual basis. The laboratory analyses will be done by an EPA approved laboratory using standard EPA methods, but the detection limits will be much higher than the Minnesota Department of Health recommended allowable limits (RALs).

64. Koch has developed a large amount of data on groundwater levels from its monitoring system, and it is reasonable for Koch to analyze these data to look for anomalous variations in groundwater flow. Also, soil borings should be reviewed for indicators of irregular flow.

65. Water will tend to pool in the lower areas of the LTF in the event of extreme rainfall. The contingency measures are to keep pumping the collection basin until the LTF drains and the collection basin is emptied.

LIST OF ABBREVIATIONS

ac.	Acre
BOD	Biological Oxygen Demand
API	American Petroleum Institute
API Separator	American Petroleum Institute Oil Separator
B[a]P	Benzo[a]pyrene
cc	Cubic Centimeter
CEC	Carbon Exchange Capacity
cm.	Centimeter
COD	Chemical Oxygen Demand
CPAH	Carcinogenic Polyaromatic Hydrocarbon
cu.ft.	Cubic Feet
DAF	Dissolved Air Floatation
EIS	Environmental Impact Statement
ft.	Feet
GPD	Gallons Per Day
HW	Hazardous Waste Unit
in.	Inches
ISC	Industrial Source Complex Model
LTD	Land Treatment Demonstration
LTF	Land Treatment Facility
MEK	Methyl Ethyl Ketone
MGD	Million Gallons Per Day
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standards

LIST OF ABBREVIATIONS
(Continued)

NPDES	National Pollution Discharge Elimination System
PAH	Polyaromatic Hydrocarbon
RAL	Recommended Allowable Limit
RCRA	Resource Conservation and Recovery Act
RGU	Responsible Government Unit
SEIS	Supplemental Environmental Impact Statement
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant