7/8/82

US EPA RECORDS CENTER REGION 5
514203

GCA - supplied bottles etc.

* More water

12 [redacted] 24 - 48
4 soil samples
Aug - Sept.

13
6
78

2 - soil samples

4 sludge samples to be run
GCMS

No more HPLC

* I owe them protcol for G

Detection limit for soils:
5 g = 0.5 - 2 ppm

* I owe GCA change
scope of work.

GCA 180,000

$ ~~36,400 left~~ $ 60 K left

Task F-C -

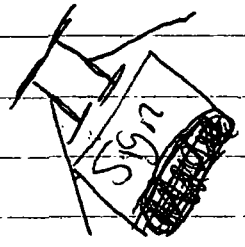
Task

2 soils samples

2 - 1 liter samples of dirt

Remember.

Next Mo. report to get to me 8/9/82




Sludge results due 2nd week of August

**MEMORANDUM OF CALL**

TO: Kosakowski

☒ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

Rick Ferguson

OF (Organization)

☐ PLEASE CALL → PHONE NO. CODE/EXT. _____ ☐ FTS

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

St. Louis Park (NPCA) mtg will be held on the 14 instead of 10/7.

RECEIVED BY Ella | DATE 10/5/81 | TIME 10:50

63-109

STANDARD FORM 63 (Rev. 8-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.6

☆ U.S. G.P.O. 1980-341-529/21

MRI analyses
MDH "
USGS "
USGS preparing articles - 6

EPA request to get Hult as expert

Talk to Roy

Who drilled present testing wells?

Center for Excellence Epidemiology
Univ. of Pittsburgh
EPA project officer
Call Hayes

Sat biopsy

Epidemiology

Mandell proposed study
1979 - 1981 - 3 yrs
only look at SLP

Andy Dean — MDH
612 - 296 - 5212

No cancer registry

Who heads CDC
ask Lamar Miller

11-18-81

Mike,

The NTIS Reports on this list of Footnotes have been borrowed from the EPA Library at this time. The Reports are on microfiche, but these cannot be loaned from the library and are too long to be easily copied. As another alternative, I could ask the EPA Library to borrow hard copies of the reports from other sources, but I have no idea how long you would have to wait for them.

Please give me some sort of idea if I should pursue this further.

Mark

Date

# ROUTING AND TRANSMITTAL SLIP

| TO: (Name, office symbol, room number, building, Agency/Post) | Initials | Date |
|---|---|---|
| 1. Mike Kosakowski | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

| | | | | | |
|---|---|---|---|---|---|
| | Action | | File | | Note and Return |
| | Approval | | For Clearance | | Per Conversation |
| | As Requested | | For Correction | | Prepare Reply |
| | Circulate | | For Your Information | | See Me |
| | Comment | | Investigate | | Signature |
| | Coordination | | Justify | | |

REMARKS

Attached is a discussion of Reilly Tar as part of an analysis of Drinking Water Contamination @ Remedial Sites. If you have problems with the discussion, call Bill Joyce 8624100

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

| FROM: (Name, org. symbol, Agency/Post) | Room No.—Bldg. |
|---|---|
| Nancy Willis | Phone No. 22339 |

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

☆U.S. GPO: 1978-0-261-647/3354

Bill Joyce
862-1100

# REMEDIAL ACTIONS AT SITES WITH CONTAMINATED DRINKING WATER

SUBMITTED TO:

OFFICE OF POLICY AND PROGRAM MANAGEMENT
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
U.S. ENVIRONMENTAL PROTECTION AGENCY

JUNE 1982

ICF INCORPORATED

## TABLE OF CONTENTS


| | ATTACHMENT |
|---|---|
| PREFACE | |
| I. Application of Extent of Remedy Decision Process to Contaminated Drinking Water Situations | A |
| II. Case Studies | B |
| -- Sylvester Dump, New Hampshire | |
| -- Price Landfill, New Jersey | |
| -- Reilly Tar and Chemical Corporation, Minnesota | |
| III. State Responsibility in Drinking Water Remedial Actions | C |
| IV. Use of Standards in Drinking Water Remedial Actions | D |
| V. Preliminary Indications of Potential Drinking Water Contamination at Interim Priority List Sites | E |

[1]

8/24/82

Notes from meeting with Reilly Tar and Chemical Company Representatives

List of attendees is attached

Introduction by Erica Dolgin, Ed Schwartzbauer

Francis McMichael discussed ERT's perception of the problem as follows:

[1] Trace PAH in Prairie du Chien - Jordan aquifer

a) 15-20% of water supply closed

b) treat ground water at St. Louis Park Wells

i) standard of treatment level is needed

ii) ERT will define levels for public use of water

iii) ERT will define numerical limits, sampling protocol and schedule for an operating treatment system. Action taken for violations of treatment levels would be stated

iv) levels for drinking water should be based on a scientific approach to protect public Health

e.g., look at levels of PAH in other cities, esp. along Mississippi River and compare level of treatment (for St. Louis Park) with levels found in other cities

( ~~tangent to relate to~~

[2] Problem should be measured after treatment per NCP

NOTE: Attempt to relate Reilly Tar problem to a larger universe that would diminish the "social impact" of coal tar derivatives in SLP ground water.

[3] Ground Water Management is a lesser priority
a) prefer to allow ground water to travel naturally to Mississippi for discharge
b) only treat water when/if used
c) remove pollutants found in all wells (note: levels were not expressed)

[4] Soil Pollution
a) Isolate, contain, remove pollution on a broad scale.

Conclusion: define basis of acceptability of PAH in drinking water; prepare and define sampling approval for compliance purposes; provide action for violations. Provide long term approval for identifying sources. Use existing wells for gradient control and/or water treatment

Schwartz, Bauer = SLP should not be treated different than the rest of State re: PAH levels in drinking water
Propose standard be developed by State
Potable ~~water~~ water supply is measured at tap vs. source
[NOTE: ignores that ground water is the "tap" for numerous private wells now and later]
A] Propose that Reilly finance study for water treatment
i] schedule for implementation is about 1 year from now.

Mr Michaels ≈ priorities for drinking water proposal limited to ~~Reilly Tar~~ SLP only ;
put SLP on level of National Exposure to PAH

Klepinger ≈ implications is that SLP should have drinking water supply as bad as the worse case existing

Hansel ≈ ~~quest~~ requests standard proposed by Reilly
[NOTE: Now given by Reilly Reps]

Hansel & Wilke ≈ prepare protection [preservation] of aquifers not only treatment of known sources of contamination ; must be part of comprehensive solution [future use issue]

Craun ≈ priorities are necessary and water supply is first priority for SLP

Mr Michaels ≈ Source must be controlled or removed to reduce possibility of harming beneficial uses of water
[NOTE: did not define beneficial use or limits which would protect beneficial use, etc.]

a) drift is source - ∴ control

i) monitor concentrations in drift

ii) develop alternatives if changes occur in concentrations [of PAH] in drift

[1]

Afternoon

OBJECTIVE: LIST Common elements discussed between two parties, [Reilly + Gov't]

| Element | Reilly | Gov'T |
|---|---|---|
| ① Adequate $H_2O$ supply Well 17, | A | A |
| ② Source Control, W-23 W-13 Swamp + drift Water | B | B or C |
| ③ Pathway Control, multi aquifer wells, gradient control wells | C | C or B |
| ④ Monitoring Program | A | A |
| ⑤ Standards Development | A | done |
| ⑥ Community Relations Plan [Common to both] | | |

McMichaels ~~+ Craum~~ ≈ W-23 has always been known to contain a large amount of debris + contamination [This is a change in posture, i.e., the admission of contamination in W-23] over a long period of time]

Craum ≈ Seems like W13 should be pumped for treatment

Hansel = should be cautious about disturbing the equilibrium within Peat deposits until a [Comprehensive] solution is developed. Could worsen the [transport] situation beneath the site.

Criteria for Potable $H_2O$ = sum of carcinogenic PAH < 28 ng/l and non Carcinogenic PAH < 280 ng/l

Crawn = sum of non Carcinogenic PAH may be difficult to attain [for treatment system] [Issue may exist as to how the number was developed]
Hansel provides Rational, 3 main ~~Cite~~ arguments lead to number

Wilke = must consider protection of Prairie du Chien for future water supply, due to population growth, low flow in the Mississippi

McMichaels = agree with Wilke, but must write scenario to predict [or plan] future use and conditions of Prairie du Chien and Mississippi

Schwartzbauer = Can't "write off" Prairie du Chien
[for Convenient/self serving purposes]
A] ERT will focus on alternate water supplies vs. treatment
B] ERT will consider options for Containment of Contaminants in aquifer
C] ∴ gradient Control Concept feasible if alternate supplies are found for drinking water

[C] NIGHT TIME

Craun ≈ would like to test ground water for TOC, TDS COD parameters

Hamel ≈ explains scope of work in pending Cooperative Agreement

McMichaels, Schwartzbauer ≈ claim that multi-aquifer well abandonment may not be necessary if treatment of contaminated water occurs. Well abandonment should be a lower priority, possibly part of a comprehensive solution.

Schwartzbauer – ERT will prepare feasibility study for Swamp

Hamel, Bitter ≈ deadlines for submittal should be 8 weeks for Reilly's comprehensive solution and two weeks for participation of Reilly in CH2M-Hill study [ground water treatability]

Schwartzbauer ≈ there seems to be no conflict with ~~the~~ our [ERT] review of the CH2M-Hill contract, perhaps you should continue with it and we could pay you part but we have had trouble before in assuring a quality output ~~[illegible]~~ ...

Bitter – we (governmental agencies) want to assure a quality output and we can do this by placing controls over the implementation of the contract...

Craun ≈ the contract looks good based on our short review time, there are a number of "do loops"

Hamel, Crawn ≈ explain "do loops" as a logical process that requires analysis of data and outputs before continuation of study.

Butler ≈ what direction will Reilly provide?

Schwartzbauer ≈ propose to participate [technically] on review panel for CH2M-Hill study...

Can't speak for Reilly Tar [financial participation] but they generally follow my suggestions

The earliest we can answer the [participation - technical & financial] is next week when Reilly Representatives are available for consultation.

Schwartzbauer ≈ proposes to hire third (unbiased) party to set on panel, perhaps somebody from Monsanto

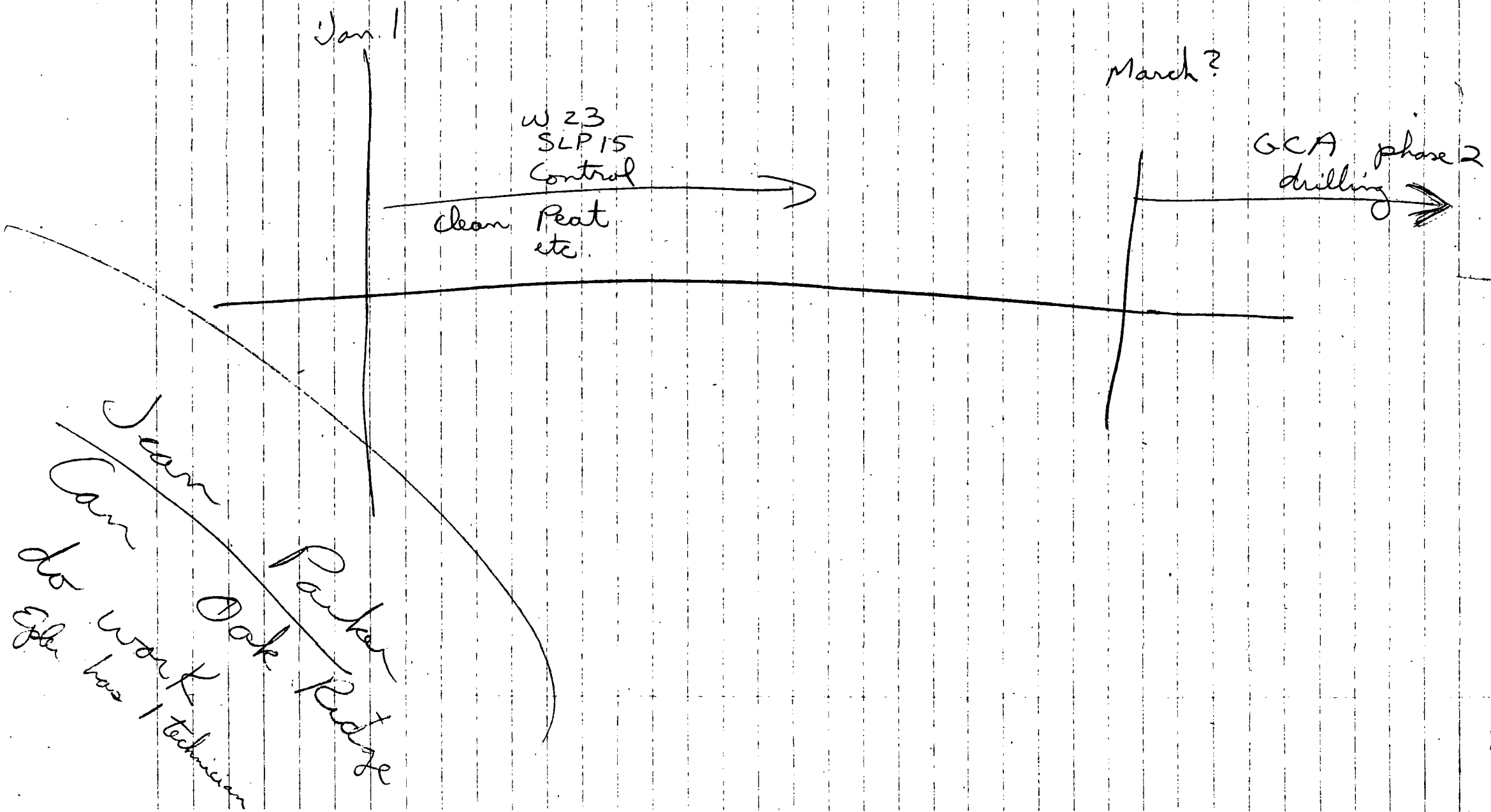
Weber ≈ He [third party] would not be unbiased if he is hired by Reilly

Schwartzbauer agreed

[Meeting finished with the understanding that Reilly would submit proposals for technical and financial participation within a two week period for the CH2M-Hill study and an eight week period for the Comprehensive Solution comparable to the pending EPA/MRA Cooperative Agreement]

August 24, 1982
Reilly Tar

| | | | |
|---|---|---|---|
| Dennis McCayne | Atty | State of MN | 612-296-77[illegible] |
| Stephen Shakman | " | " | " 296-77[illegible] |
| [illegible] | Consultant | " | 202-[illegible]-10[illegible] |
| Dale Wiley | Dir Solid & Haz Waste | " | 612-297-2735 |
| Wayne Popham | St Louis Park | | 612 353 4800 |
| John Crann | ERT | | 412-261-2910 |
| Francis McMichael | ERT | | 412-261-2910 |
| Ed Schwartzbauer | Dorsey & Whitney | | 612-340-2825 |
| Robert Polack | Reilly Tar & Chem | | 317 248 6466 |
| Carl F. Lesher | " | | 317 248 6457 |
| David Hird | US Dept of Justice | | 202 633 5466 |
| [illegible] | U.S. EPA (Region V) | | 312-886-6720 |
| Erica Dolgin | U.S. Dept of Justice, Wash. D.C. | | 202-633-52[illegible] |
| Paul Bitter | U.S. EPA, Chicago | | # 312-886-3007 |
| Michael J Hansel | MN PCA | | 612-297-3770 |


Jan. 1
March?
W 23
SLP 15
Control
clean Peat
etc.
GCA phase 2
drilling
Jean Parker
Can Oak Ridge
do work
Eph has 1 technician

Sample and analyze 7 wells selected by the project officer for all chemical constituents as specified in "Sampling and Analytical Protocol," Attachment 2.

SCOPE OF WORK

~~Analyze those items identified in Table 1 according to the attached "Sampling & Analytical Protocol."~~

~~All samples except the liquid phases for wells 15 and the control well will be provided to the contractor. The contractor will in all cases provide the sample containers on location at the time of future sampling.~~

A written report is due by June 1, 1983.

Project Officers:

Paul Bitter (primary)
Region 5
312-886-3007

Michael Kosakowski (secondary)
OWPE - HQ
202-382-4814

The Tar samples for well 23 will be provided by the Minnesota Pollution Control Agency. The samples shall be taken in conjunction with the on-going coring work by GCA.

for wells 13, X, Y and the control drift

- Separate S.O.W. for expert witness and for contract lab.
  → * need more detail - (eg. # of samples)
- Separate cost and resource projection for each w/ detailed schedule (need better breakout of costs)

- Need better sole source justification for both

- DOJ letter should reference names (appears generic at present)

- provide references to indicate protocol is standardized or reproducible (not ASTM, etc.)

- demonstrate need to duplicate state efforts (eg. co-operative agreement) (eg. sample analysis)

original cost estimate was $70K

- will need S. Kovell to initial off on TDD request

will need to be processed under New Rem/FET contract using REM subk. $
Scott Parrish will need to approve

Number of Samples
Cost per sample
break out Kimble's costs
Geographic desirability

Memo to Kovell
re: PPT analysis

in Capsule Sole Source Justification

CH2M Hill — claim
resin 5% efficient
Mike Harris
Denis Foerst — QA/QC

Not doing priority pollutants

trained spectrometrist look at each spectra

drift must ~~be~~ run through
resin

PB 301 313/3BE

~~PB 215 313~~

Berglind $H_2O_2 \xrightarrow{UV} 2OH^-$

↳ needed for oxidation

humis was mineralized

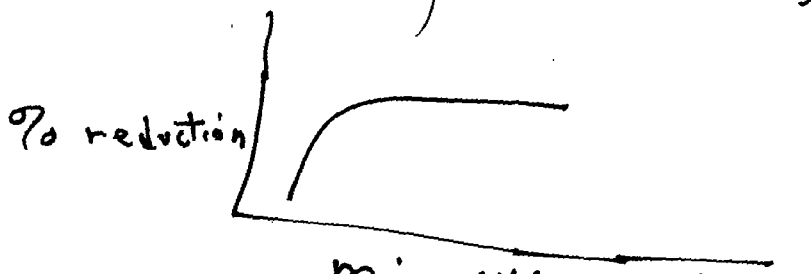
99% removal (mineralization) of BaP from a 100 ug/l solution

510

544

starting c 65 ng/l

| min UV rad | wo $H_2O_2$ 3,4 BAP | w .1 ml 35% $H_2O_2$/l 3,4 BAP |
|---|---|---|
| 0 | 65 (0) | |
| 30 | — | — |
| 60 | — | — |
| 120 | | 18 (72) |
| 240 | 42 (29) | 6 (91) |
| | — | 1 (98) |




( ) = % reduction

$1.62/m³ for 50% removal of BaP
for 95% removal costs are 40% to several hundred% higher
$CO_2$ & $H_2O$ final product
most effective dose of $H_2O_2$ appears to be independent of organic concentration

Removal of organic matter from $H_2O$ by UV and $H_2O_2$
L. Berglind et al

The Use of $H_2O_2$ in $H_2O$ Treatment

H Ovenoth

→ $H_2O_2$ as oxid agent

$$H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O \qquad E_0 = +1.77$$

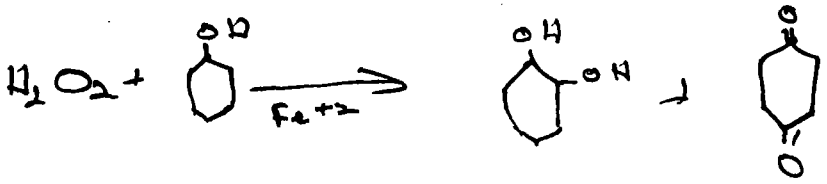
$$H_2O_2 + 2e^- \rightarrow 2OH^- \qquad E_0 = +0.88$$

- $H_2O_2$ as reducing agent

$$H_2O_2 \rightarrow 2H^+ + O_2 + 2e^- \qquad E_0 = +.68$$

- can decompose into $O_2$ & $H_2O$ in an intermolecular redox rxn.

$$2H_2O_2 \rightarrow 2H_2O + O_2 + 46.9 \text{ kcal}$$




$$\underbrace{Fe^{+2} + H_2O_2}_{\text{Fenton's reagent}} \rightarrow Fe^{+3} + OH^- + OH$$

EPA 570/9-79/020

Oxidation Techniques in D.W. Treatment. Drinking $H_2O$ Pilot Project

Eng. W. Kuehn, et al

1979

GCA

Water – $250 – 350

Soil – GCMS confirmation contingency

Vol. 100
Neutr. 800
Acid 150

118,000

$16,000

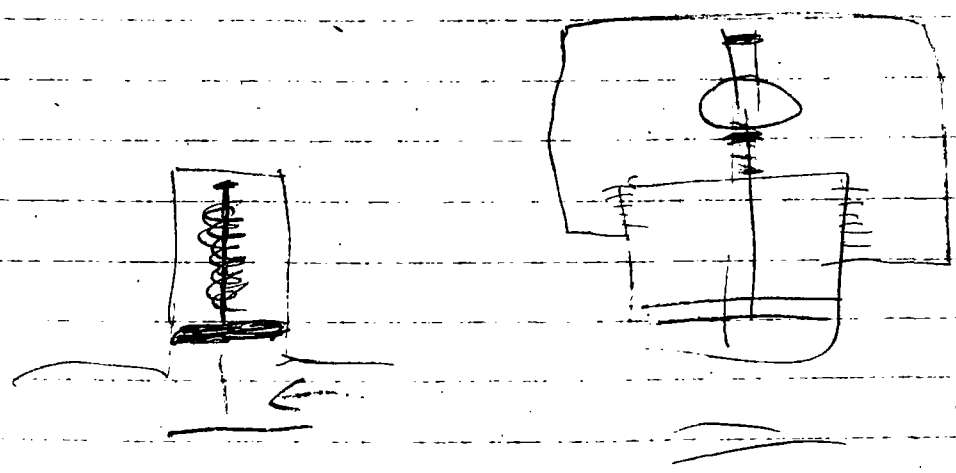
21 locations

Run some background } 77 samples — hexane extractables first

-5 40' at 3
-4 20' at all
3 — 15' at voids } dumping

split & wait
then PAH

— Previous EPA letter forbidding pilings to bedrock.



# Things to do

8-22-81

~~1. Call Dick Williams on Monday 8-27-81~~

2. PHA – HPLC analytical lab

3. PCB analyses

4. Check on E&E CRS arrangements.

Mark Hutson

5. U.S.G.S. looking for $ 33,000 for 2nd year mainly personnel

drilling in September

~~#~~ ~~#~~ unsaturated zone

soil auger – 4" solid stem hollow stem

40 samples in 2 days

~~6. Call Tom Yeates Monday~~

D

Fisher & Calo

1. 4 [redacted] soil samples partitioned in 3 parts

2. 3 more at

3.

$ [redacted]]

— $ 47,000

— $ 133,000 — left for Reilly

5 sets of blanks

David Gray - MDH
1-28-82

GCA
Sandy Sandberg
Joanna Hall

Miss. River - 4 stations
STP

Water
HPLC - PAH
TSS

water: 10
2 empty bottles

16 STP
2 empty bottles

Sludge: 8 samples
PAH

---

2 soils of north site (Block 1)

TOC
PAH - method 610
surrogate

---

5 water samples

wells 14, 15, 16, 17(15)

5(1 lt) 1(1 gal) 1(1 gal) 1(1 gal)

8/14 Reilly Tar

Conference call -

Dennis Coyne
Rick Ferguson
Mike Convery

200 - 300 samples

Priorities St. Louis Park -

#1 1. Soil samples - PAH (HPLC) phenols O&G ~~Benzene extra~~ ~~[illegible]~~ Benzene compost Base Neutrals
2. Off site

#1 3. Plattville drift ~~100~~ ~ 75 wells
PAH - HPLC
Base-neutral
Volatiles
Acid Fraction
No Pesticide
Na - ($NO_2$ - $NO_3$)
tracers

Prairie du Chien
look for base-neutral
volatiles

#2 4. Mississippi - Minehaha Creek - 68 ~~[illegible]~~
Metro - infl. - effl. - sludge -
~~May - June 1980 PAH~~
~~cation anion~~
~~[illegible]~~ PAH (HPLC), Base neutral (naphthalene) GCMS

Metro - aeration - activated sludge

#3 5. Finished Water
Iron removal
Sand Filtration
Chlorination
Storage
HPLC -
9 - GC-EC - chl.

Well #15 800 - 1000 gpm
2 weeks 35 samples

12/13/74 1.01-002.0
Constituents of coal tar
benzo-α-pyrene
chrysene

1.02-002.0 city tested Wells &
Flame industries .003
Robinson rubber 1.2
Minnesota rubber .009
S&K Products .003
Food Producers <.002
McCourtney Plastics .023
City Hall <.002
for unspecified chemical & units

1.02-004.0 NPDES permit issued to St Louis Park
storm sewer monitor daily max
var. daily max
Phenols 0.01 mg/l daily
benzo α pyrene 0.01 μg/l mo
chrysene 0.01 mo
MN 0045489

1.02.005.0 Serco claims detectability of
chrysene & benzo α pyrene of 1.0 mg/l
using GC / Flame ionization detector

1.02-006.0 Coal Tar products 2,4 dimethyl phenol
benzene
picene
naphthalene
anthracene

.02-009.0 Report on Creosote & PCP pollution
of groundwater from pole treating
yard So. Ca. Edison Co.

1.02-130.0 Meeting between USGS & ERT
(Reilly consultant) April 21-22, 1980

Steve Shackman

Rick Ferguson 612-297-3365

Memo Hilt → Ross MDH

17.16 Spring '79

— D&A Lubricant
gnd. wtr. monitoring (shallow & deeper)

Pleadings 02

Ottawa Junk Yard

79. Interrogatory
Peat
Androc Chemical — PCP
Golden Auto Parts
Gasoline Storage Tanks — Terry Bos.
unlead gasoline leaking

14.02-001 6/1/70 memo

Sources of air pollution
Wheeler Lumber Bridge and
Supply Co.

Marc Hult knows of employee at McCourtney Plastic who witnessed creosote spill as a child into W23

Steve Shackman
clerk for
Ken Stevison — 877 6-7703

MPCA

MDH

USGS samples at MRI
6 week turnaround

MPCA
Steve Reed Nov. 1980
briefing memo
Fred Stiehl has memo.

Dan Gillies — supr of hydrologeology office — USGS Don Alban chief
Minneapolis
opposed to USGS involved.
Water District

3/5 1103 2:00 Jeff

KOSAKOWSKI

9/18 SLP City Hall

EDF — Ruffin Harris

John Hubach contacted Harris
no one from city attended
only Steve Shackman from State
Superfund:
1. quick fix (cosmetic)
2. no federal funds received
3. SLP says no problem
state & federal say bad
4. Past EPI demiology study inadequate
5. State studying since 1938 - slow
6. Mobilize citizens
7. EDF will provide technical
assistance to citizens
to comment on Superfund proposals

Bob McKinney — Human Genetics
Mandell

Attendees 12/18/81

Briefing on St. Louis Park

| Name | Representing | |
|---|---|---|
| Donald R. Allin | USGS - St. Paul | 725-7841 |
| Stephen Shakman | Minn. Atty. Genl | 296-7703 |
| Eldon S. Kaul | " " " | 296-7341 |
| Dennis McCoyne | " " " | 296-7702 |
| Ken Stevenson | " " " | 297-7708 |
| PAUL BITTER | USEPA | 312-886-3007 |
| Richard R. Ferguson | MPCA | 612-297-2726 |
| Stephen Lee | MPCA | 612 297-3355 |
| Michael Kanner | " | " 297-3352 |
| Douglas Day | " | " 297-3351 |
| David J. Arnderter | Arnderter Associates | 612-432-1792 |
| FRANCIS X. HERMANN | U.S. ATTY OFFICE | 612-332-8961 |
| VERN Tollefsrud | City St. Louis Park | 920-3000 |
| GARY L. Englund | Health | 296-5330 |
| H.O. Pfannkuch | Univ MN | 373-5678 |
| Roger L DeRoos | Health | 296-5320 |
| Ed Ross | " | 296 5338 |
| R M Brown | USEPA (consultant) | 713 845 5251 |
| BOB LENINGER | USEPA/Chicago/Attorney | 312-353-2094 |
| MICHAEL KOSAKOWSKI | US EPA / Wash. D.C. | 202-382-3118 |
| GARY ROBERTS | Metro Council | 612-291-6484 |
| Clem Vath | Roy F. Weston Inc. | 312-498-9090 |
| GARRY EHRLICH | U.S.G.S. MENLO PARK CA | (415) 323-8111 |
| Dick Koppy | City of St. Louis Park | 612-920-3000 |
| MARCEL JOUSEAU | Metro. Council | 291-6402 |
| Daniel C. Gillies | USGS - St. Paul | 725-7841 |
| Brian A. Rongitsch | DNR - DOW | 296-0434 |

| NAME | REPRESENTING | |
|---|---|---|
| Sarah P. Tufford | MDNR Water Div. | 297-2431 |
| GILBERT GABANSKI | " " | 296-0431 |
| George Groskopf | U.S.G.S. | 725-7841 |
| DON SIEGEL | " | |
| MARK HAVE | " | 725-784 |

- Agenda -

St. Louis Park Working Group
9:00 am
November 19, 1981
St. Louis Park City Offices

I. Review of Agenda

II. Review of Minutes of October 14, 1981 Meeting

III. Sampling of St. Louis Park Municipal Wells
- Tollefsrud, Convery

IV. Status of Remedial Plan Study
- Erdmann, Convery

V. Status of EPA Grant Projects
a. Well Survey, W23, W105
b. Water Treatment
- Convery, Ferguson

VI. Status of Block I Development
- Ferguson, Convery, Thibault

VII. Status of SLP #17
- Tollefsrud

VIII. Setting Date for Next Meeting

IX. Adjournment

Reilly Tar

$100 MM clean up estimate by E & E
Reilly claims $1 MM to pay -
We will have a contractor to
Reilly's financial capabilities
hearing March 18 to dismiss, to be
filled Feb. 4

(*) Do economists in Hdqtrs. exist to review
Reilly data? Dunn & Bradstreet - Bankruptcy
Must check positions with MacMillan, Gardebring & Roisman - Will we press company
to point of bankruptcy. By Tuesday.
Conference call next Wednesday.
Must coordinate with Reilly through
Berg (U.S. attorney)

Further samples 40 water 10 soil

Larry Buc - Putnam, Hayes & Bartlett
Julie Parzen - OPM
detailed to Enforcement
0710
287-0721 3009 A ~~287-0724~~
Melanie Toepfer - 886-6748
353-2110

lawyer - Bob Leiminger 886 6720

Superfund briefing 5/5/82

Burlington Northern has offered to take extracted creosote

Russ Wyer – fund complete well abandonment rather than piecemeal.

Wants **state** to commit to match funds for clean-up.

6 months for testing

Give money to state & then to USGS

Newby's counter argument
legal arguments.

---

9/3/81 Reilly — Dennis Coyne
Conf. Call 9-10-81
10:30 EDST

Well 14 closed 2 days ago
temporarily until MDH
analyses are in
SERCB showed a high
PAH

Kirk Brown

B(a)Pyrene
Solvent extraction
evaporation to residue

past cores samples

2613 11:00 a.m. GAO briefing
on report, adequacy of
enforcement program on IDS
to Congressman Florio

8/26/81

Long term monitoring starting 11/15
53+ samples of Prairie du Chien
spring through summer.
Fewer samples of Simon Hinckley

Well number 1 — shut down in 1933. Arrangement with Colorad to expand there and tear down water tower. Mike Convery talked with St. Louis Park. The city will take no action until next year 1/82. Colorad won't buy if well remains. City didn't think well #1 was necessary.

John Erdmann of HicKoK & Associates
Gradient study 80% complete
Kirk has talked to Erdmann.
Hickok report due at end of Sept.

Superfund grant: needs cost effectiveness analysis being done by Region
Paul Bitter.

6 of 14 wells now closed. 2-4 near cutoff for closing. City wants water treatment to have high priority. MDH not certain about treatment

— Call Jesse Cohen re: carbon

PVC liner on site is exposed on north end, needs repair
SLP will look into

8/26/81

Townhouse private development in NW corner (Lot 1) to ~~be~~ start construction

Biocentrics ~~told~~ took soil borings some years ago.

Bill Tebell – talk to (with city)

Upper 10' of soils removed to build up Louisianna Avenue extension

A snow fence has been constructed to protect area South of Hwy 7.

Wells not recovered yet.

Don Albin of USGS.

Interest by USGS – ORD groups Menlo Park & Denver (Pave Grove)

Next meeting 10/7 9:30 at MPCA

Post meeting 8/26/81

1. QC/QA

2. Split samples with MDH on 8/10 sample

2 Supermarket wells clean

IS tied into Minneapolis only of help to SE (Well 4)

National Biocentric report 11/1/76
Soil Contamination By Creosote Wastes

Brr-scheben - Meyers - Storm drain study

Plattville wells around Bass Lake suggest Bass Lake contaminated. These have highest levels of contamination measured so far. Reservoir at 34th & Penn, Bass Lake & Basin at Reilly not sampled yet.

Reservoir flows to basin by gravity. A pump discharges heavy flows to the east.

Gradient control

| | | | |
|---|---|---|---|
| 5-10 MGD | In plattville | 50-200 | gpm |
| | drift | " | " |
| | St. Peter | 300 | " |
| | Prairie du Chien | 800 - 1500 | " |

Bedrock aquifers should be cleanable in one flushing

Contaminants absorbed onto drift material

8/26/81 a.m.

Expect some adsorption in confining layers (not easily flushed). W 38 showed contaminated confining layers.

Costs could be available to State by mid - Sept.

transmissivity of aquifer varies by factor of 4 HicKok designing conservatively.

Treatment of gradient control wells & use in water distribution system still being considered.

— Warren Thompson - HicKok may contact but I'm not funding

---

p.m.

Include reservoir, Bass Lake & Reilly pond

Well Water now sampled turned on ~ 15 min. discharged to sanitary sewer. PAC treated water discharged to sewer

2 - $200,000 pilot → full scale

6 mos. after start

8/27/81 Orr – Schelen – Mayeron & Associates

Dennis Coyne
Mike Convery MDH
Bernie Middlested
Gene Anderson OSM
Wayne Long

Agenda
1. water distribution
2. reservoir at 32nd & Pennsy.
3. soil borings when sewer construction

OSM involved since 1958 – 1959

In 1950's deep wells manually operated & tanks not monitored ∴ tanks went dry.

48" trunk line from Minneapolis runs along eastern boundary of SLP

When OSM first involved SLP already had an integrated water supply system.

Well 8 put in by developer & later connected with city.
Wells 8 & 16 always running – supplying to central city system
OSM report of ~ 1960

Morningside not part of SLP

— check on incorporation

~ 1 man-yr. effort to review city records.

— analyze aerial photos for all SLP

— there may be a large map of city showing connection of water system.

Control ~~paths~~ panels of 196[illegible] & 1980 by OSM.

The SLP pipes aren't big enough to get water from Minneapolis except for well 4.

Storm water sewer reports.

Ponds on site put in 1973.
Penn & 32nd pond flowed east
Low spot before ~ 1970. Then storm drain cut to deepen low spot & made into reservoir
Pump station put in then.
Dug out layer put north of reservoir.
Prior to installation of pump house storm water seeped into ground.

— When was reservoir connected to Riley basin?

OSM took soil boring to check support strength.

8-20-81 Reilly Tar

Well 5 closed

Iowa State - University Hygienic Lab ran samples for St. Louis Park

Found 1 ppb of noncarcinogenic PAH

Sign up in NW corner of site
townhouse for sale in Jan 1982
sold to new land owner

Emory to finalize interrogatories on financial questions

Question of what to do with carbon treated water - combine with

Soil samples - only some needed for PAH
The rest can be O & G etc.
Talk to Erica

Consultants to city on water supply system. Erica advised getting city to pay.

— Ask Kirk for Resumes

I asked Region to look at other Region 5 Reilly sites

Pankanin will look for Melanie's report.

— Come travel funds
Where to interview

Who pays for experts

8/4/81
ST. Louis Park — P.R. tape

Dick Koppy — Public Works Director
Get picture of Reilly operations
Instrumentation not available before 1978.

Health effects concern because of laboratory animal tests

Tested treatment by: PAC
GAC
$H_2O_2$ — not successful

Wells 10 & 15 — pilot plant

Capital cost $100,000 — PAC
cost of $H_2O$ $0.90/1000 gal
20 yrs. $11,130,000

Current cost $0.45 / 1000 gal

5 wells shut down — minor production
9 " operating 20-25% capacity

During dry weather — last year
1st sprinkling ban.
Didn't mention last year turning on wells.

1. Looking at soil treatment
Grout curtain around contamination zone — to bedrock ~ 90'

2. Gradient control wells.
Treat perhaps with PAC & use as drinking water.

8/4/81

~~N. Braift~~
Fridley has contamination problem.

920-3000

David Graig - MDH 296-5352

---

Ken Stevison - M
TAXONOMY - in preparation for deposition

Herb Finch - Former plant manager working for Webster lumber
Decision not made when to depose him.
Not decided to make computer system public yet.

Taxonomy done for Minnesota alone.
Aspen not willing to have this data system made public or contested.
Protected court order.

Organized by source of discovery.

Reilly's attorneys have a computer system

Screening to be done early Nov.
Mid - February system done

6/25/81 Reilly Tar

Money to State any day now

1st increment $200,000

1. On-site ~~seal~~ ~~both~~ plan to seal wells on-site
sample core in well
drill parallel well to R-T well

2. Off-site classify wells.

Next $200,000

Pilot treatment plant at well #15

Wouldn't be ~~sampled~~ sealed until next spring

DOJ trying to schedule state - U.S. Attorney - EPA meeting at time of regional meeting

Roy F. Weston to review HicKoK work

9/16 Motion of Dismiss

Asst. U.S. Attorney

Reilly willing to pay for alternate water supplies

Leininger will prepare draft of our proposed interrogatories to add to State's by end of week.

Pankanin to forward information request

6/15 ~~Say~~ Jack Brown
Reg. 5 Superfund

$400,000 cut to $200,000

Talk to Paul Beam 382-2339

may be reinstated when Superfund appropriations

1. On site well abandonment
2. OFF site " "
3. Well 15 (barrier well/carbon testing)

dropped for now

Lucy Siebold — grants

Minn. signed grant but not RA yet

Office of Superfund
111 W. Jackson
Chicago, ILL 60604

Rod Blosse — E&E

2/23 Reilly Tar with Tom Berg
U.S. Attorney Minneapolis

Superfund plan to cost $ 414,000

Reilly Tar seems amenable to talk

Berg to hand Reilly Tar Superfund letter giving them the opportunity to do the Superfund work.

Start negotiations on 5/1/81
The Judge has a large backlog.

Work with Melanie to outline remedy.

§ 107 (a) can decision on trustee be made quickly.

* Read Melanie's draft consent decree comment by March 6

Melaine to send § 3007 letters to other sources

1-26-81

Reilly - conference call with Jim Bunting by Fred, Lamar, Frank & me.

Jim - timed payback of Superfund clean-up.

On Superfund top 9 list.
∴ Notification of company of use of Superfund §104.

Recover under § 112

Reilly Tar Meeting
June 8, 1982

| | | |
|---|---|---|
| Dennis Coyne | Atty Gen'l - MN | 612·296·7702 |
| David Warshawsky | U. of Cincinnati | 513 872 5730 |
| Steve Reed | MPCA | 612 297-2710 |
| MIKE KOSAKOWSKI | EPA (Wash) | 202-382-4814 |
| Mike Hansel | MPCA | 612 297-3353 |
| BOB LEIDINGER | U.S. EPA (Chicago) | 312-886-6720 |
| Stephen Shakman | Atty Genl-MN | 612-296-7703 |
| Brenda Kimble | Amphion Associates, CA | (415) 372-8260 |
| Warren J. Thompson | Miss. State Univ. | (601) 325-2116 |
| David M. Taliaferro | U.S. EPA | (312) 886-6826 |
| Erica Dolgin | U.S. Dept of Justice | 202-633-5258 |
| Deborah WOITTE | U.S. EPA | 202-382-3080 |
| MARC HULT | | |

6/9/82 MIKE RENNEKAMP GCA

DENNIS FOERST EMSL / CINCIN. 513-684-7311

Reilly Tar Negotiations
February 4, 1985

Duration: go through RAP + identify cessation point rather than performance criteria for each aspect; R.T. wants not extend aspects ~~not~~ to have an endpoint
- RT has K problems w/ the city

Review of 2/3/85 draft

B. Parties: add DOI (USGS) on RT side
the paper wh says DOI is OK w/this

C. Background
- expand ¶4 w/re to hold harmless of SLP
- BC → BS w/re to SLP
- consider omitting the "list"
- find agency decision is OK

Dispute Resolution
- art + capricious standard for fed review is reasonable because of the flexibility we gave them w/re to the remedy

Fin. Resp: RT shows enough $$ + notifies us if ↓ 20% then w/in x days they get an obligation wh we think is necessary
— Bulk of RT → SLP should be put in escrow to be used only for the contingency → eg let the state town or the court hold the bag

12. Release
- don't use the term "wetlands"
- we can't agree yet to the state's (b), (c), + (d) but must stick w/ our (a) of 11/1/84
- RT wants to qualify imm + subst and to "knowns".
- we want "off site disposal language" (but see 15)

13. Financial Resp.
- Hinds idea of $5 million plus bonds maybe OK
- omit last # of state version

14. Duration
- omit entirely
- RT wants on out

1-30-85
Meeting w/ Mgt.
Reilly Tar

# I. Consent Decree

B. Parties: add Oak Park, Rustic Oaks + Phillips Investment
C. Background: "Chem substances" defined
"what is known" is defined
RT added other studies
D. Purposes of Decree: add RT's lost $ re: other proceedings
E. Rem. Action Plan: use RT version
F. Resolution of Disputes: RT written statement, we review + decide,
RT takes it to court w/in 10 days
RT wants time extension } - fall back: informal, then 30 days, then court w/
RT B/P w/ arb + capricious
G. Schedule for Contingencies: may go in RAP
H. Review of Submittals: our language; RT wants drop dead time
I. Creation of Danger: our language
J. Reporting: use RT $
K. Stipulated Penalties: ~~no step~~ for good faith dispute
resolution is OK, milestones OK,
L. Delay or Prevention of Performance:
- change ours to entitle them to extension
for delays caused by circumstances beyond
RT's control
M. Project Leaders: Keepours
N. Access: RT wants to not have to pay access fee but will
have to restore property to its original condition
O. Assignment of Resp. to SLP: OK but 30 days
P. Past Costs: up to 2.5 million but settle for $2.5 million
- consider deferred payment plan
Q Future Costs: consider a cap/yr
R Hold Harmless: ~~[illegible]~~ see A + F

S. Other Claims: RT made minor change
T. Other Laws: omit our 2nd + 3rd ¶ + modify the 4th one
U. Releases + Covenants Not to Sue:
- present draft says after RAP is over, RT is released from claims in complaint relating to disposal, presence, migration, etc of coal tar at + from the site + past costs; not released from I/G, swamp; covenant not to sue for "presently known" as long as RT is in compliance w/ C. Decree; imm + subst; NCP costs for unknowns
- R. Tar says:
  - release from all claims wh could have been asserted; §106AO; State RFRA; natural resource damages based upon "information known"
  - cov. not to sue if R. Tar remains in compliance
  - imm + subst OK
  - NCP + recovery OK for unknowns
- fall back: release is effective after GAC, gcw, multiaquifer well abandonment + swamp

V. Prod of Data: OK
W. No Claim Against SF: OK
X: Severability: omit
Y: Public Notice: Keep 1st sentence only
Z: Effective Date: OK
AA: Financial Resp: 30yr bonds for O+M, monitoring, contingencies
5 million for GAC, gcw, well abandonment ⇒ omit when done OK

## Litigation

11/30/84 Case Mgt Order

① - RT liab + remedy } 4/29 no jury
- constitutionality
- costs
- not resource damages } phase II jury
- RT + interven on issues

② Disc. is stayed as to phase II

③ all reports are due + in except RT needs to supplement pursuant to Order of Crane Winter

④ Exhibits due 3/29

⑤ All depositions done by 3/22

⑥ All data to be used at trial submitted by 4/3

⑦ Final pre-trial conf on 4/29

⑧ Special Master

## Depositions

week of 2/4 Gary Englund (state) Warren Thompson (SS WS)

2/11 John Crane + Wm Gregg

2/18 Mark Hult, Dr Pfannkuch ; Santodonato + Andelman

1-22-85
Reilly Tar

Grundler, E S, Pete Shanahan, J. Craun, B. Comstock, Pollak, Lesher, Maxwell, Fleusheous, Riner, Wikre, Shakman, Hird, Bitter, Elizabeth

Wikre: sets forth major concerns in RAP

John Craun

Drift aquifer
- good boundaries on S+E end of plume + concluded small, 25 gpm would suck up the & put in sanitary sewer unless its OK for surface water discharge also RT could treat + cut O+M 1/2; the rest except for #17 + 101 is essentially taken care of ie +95% removal
- this makes sense to get rid of the worst part of the problem but also monitoring in N end of plume w/ contingencies;
- worst case is 2000' wide plume w/ a .35 CFS flux + ∴ its OK to Mississippi; 4000' long plume takes ~ 20 yrs to pass a point
- talked about plume in AD Chien
- concern about NPDES permit: Wikre agreed w/ Comstock that MPCA can come up w/ the numbers they will propose for the permit
- PS: daily max should be acute criterion & monthly ave should be based upon ~~[illegible]~~ chronic criterion

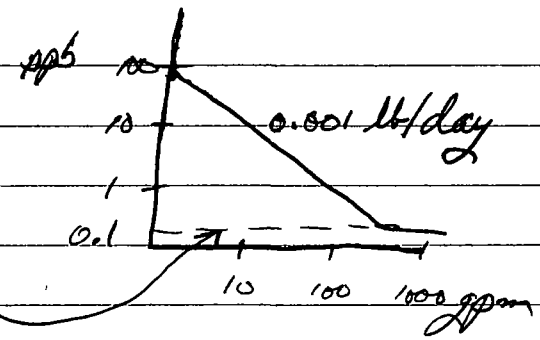
9.1.4 Cessation

- Continue to monitor + cease after the wells are clean for a period of time
- we said 5 yrs, they said 3 months, we said > 3 mos or ↑ monitoring after shutdown; don't shut off right away, wait for 5 yrs.
- Comstock: RT needs some sense of finality, partially due to their negotiation w/ SLP
  Consider a review procedure at 5, 15, 30 yrs etc. so that the "governing body" can decide whether the decree can be modified
  She said they have legal problems

Prairie du Chien

RT says don't monitor so much ∴ the 4 additional wells aren't justified because the additional information won't significantly ↑ our ability to predict contamination of other municipal wells, especially since it will cost $125,000

## Multi-Aquifer Wells




- RT proposed criteria for well abandonment 0.28
- Wikre: this might be OK in the zone of capture
- RT said 4 yrs to do 10.2.1
- most of these are PDC wells, but some are St. Peter
- RT says: map aquifer capture zone conservatively + consider abandonment at Reilly's option

## Ironton - Galesville

- either no release or pump until its clean
- Brimeyer said no way they use it

## Drinking Water Criteria

## St. Peter

- RT says they do an RIFS over 3 yrs to get enough data; RT wants a .28 ppt ceiling on doing a remedy; we said no ceiling because we don't know enough now

"Lunchbreak"

Design Criteria

RT says 2.8 is a goal but is not analytically capable;

Change column when it hits advisory level

228 - 1558

---

Other issues

1.2 problems w/ IARC, RT has problems w/ fed, state being arbitrary ∴ will put in language in tracks govt. authority to "state" added

1.5

1.16 RT wants to limit it to coal tar areas; we'll see if this is OK

2.2 - check w/ SWA

2.6 : change to say these are the numbers for the proposed permit

3.5 (C) We need the data; RT says OK

(D) clarified

4.1.2 : flow rate of best 600 gpm one for g. control

4.4 : We'll give them language

5.1 : composite is OK if they have to resample w/ positive results

C : RT + we will draft language

7.1.4 Under discussion still

7.2 1000 gpm max rather than 750
920-2626

GAC @ SLP 10+15 will supposedly be up in June; RT say 106 Ord is released in C. Decree & we say OK

7.3 We disagree w/ deletion of monitoring wells

7.4.2 NPDES permit issue

7.2.5 500 gpm → we say ↑

7.2.7 reserved

7.4 5 yrs may be a problem

8 + 9 reserved

10.2.1

12.2.2 add "munic. d.w. supply treatment"

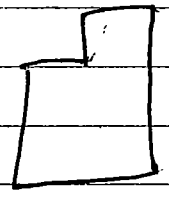
1-23-85
Reilly Tar
Negotiations

Costs

3 basic areas : ~~atty~~ fees, salaries, out of pocket
- N.E. Pharmaceuticals : 107 says recover costs, costs are defined, 104(b) says legal + to enforce the provisions of this act
- we could ask Magnuson or Winton what they think
- 830,000 as of 11/84 + now its $964,000 but RT wants it broken out
- we could forget pre-judgment interest ok was awarded in NEPACO
- RT wants to reserve post cost issue pending the resolution of other issues sine qua non

(N) Access

- RT has to restore the property



(O) Assignment

(P) Future Costs
- we still want it

(Q) ~~Hold harmless~~ → Fairmont (W. Va)
- even steven or take it out

(S) Releases
- potential hazards
- reference back to I(k) information
- (1) Known

Financial Responsibility
- they took it out; we need some financial assurances
- deposit bonds w/ the SLP reserved for contingencies
- reasonable protection for contingencies consistent w/ RT agreement w/ SLP

(2) Duration

1-21-85
R. Tan
Review of RAP

1.2 → we can't bind ourselves to an outside gm

2.2 OK except for last six lines
2.5 OK
2.6 procedurally can't do this
- also applies only to Chain of Lakes [illegible]
creek only

Ironton - Galesville
- contingency → if SLP or
Hopkins decided to use it
then RT has to treat it

D-P + St. Peter
- non-degradation concept
NPDES Permit
- 4 mon wells on PDC / Jordan
- I / Galesville

Reilly Settlement Meeting
MPCA
Jan 22, 1985

| | | |
|---|---|---|
| Stephen Shakman | Minn AG | (612) 296-7216 |
| Dale Wikre | MPCA | (612) 296-7282 |
| Stephen Riner | MPCA | 612/296-7395 |
| Jon Fleischaus | EPA - Wash | 202/382-3109 |
| Elizabeth Maxwell | EPA - Reg V ORC | 312-886-6663 |
| ROBERT LEININGER | EPA (V) | 312-886-6720 |
| CARL WESHER | REILLY | 317-638-1532 |
| Rob Polack | REILLY | 317 248 6466 |
| Ruby Comstock | Dorsey | 612-340-2987 |
| John Graun | ERT | 412-261-2910 |
| Peter Shanahan | ERT | 617 369-8910 |
| ED SCHWARTZBAUER | DORSEY | 612-340-2825 |
| CHRISTOPHER GRUNDLER | USEPA / WASHINGTON | 202/382-7790 |
| PAUL BITTER | USEPA/REGION V | 312/886-7571 |
| Mark Simonett | MPCA | 612 296 7390 |
| David Hind | USDOJ | 202/633-4592 |
| Elizabeth Thompson | City of SLP | 612-333-4800 |
| Jim Birmeyer | " " " | |

Reilly Tar
Negotiations
December 18, 1984

B. "Parties" exclude nominal Δ but RT rather would have them in so that if they settle w/ us they can't sue RT

C. Background: is OK even though their stuff is deleted
- omit "carcinogenic" in ¶4 line 2, + "thousands of" in line 6
- ¶9 replace w/ their ¶2 p. 3 because it's too specific
- ¶10: recite cross claims if we bring back in the "fringe" Δ's → their ¶11, p.
- ¶11 is unnecessary
- ¶12: add the other studies + define "what is presently known"

D PURPOSES:
- line 4 change "believed" to "alleged"
- add ¶'s 2+3 of their p. 13-14 but modify to say "we were in dispute w/re to remedy"
- insert language wh says none of the parties shall be deemed to be a prevailing party ΔH → atty fees, cover in release language
- "C. Decree can't be used for any other reason" is too broad for feds but "no admissions" is OK

E. R.A.P.
- this summary is too extensive
- omit summary

F. Resolution of Disputes
- RT has a problem w/ having a number of leaders ∴ one final spokesperson for govt.
- F & G + H should be one ¶
- if no fed/state decision ..... they win

G. Schedule of Cont:
- spell out in RAP ∴ not necessary in body of C. Decree
- final wording on this depends upon final wording of RAP

I.
- give R. Tar same authority as fed + state
- B. C. will give language to us

J. quarterly reporting + regular mail rather than cert. mail
- omit address + put in an addresses section

K. Stip $
- size of $ is too high + two ~~tier~~ tiers is no go ∴ they want $100/day → too low
- Steve S. will give them new language on validity of "K"

L. R. Tar will submit language

M. too many project leaders
- they don't want both feds + state approval

N. Access

- only a problem w/ multi-aquifer well abandonment + gcw system
- MN should provide access says RT
- RT makes "best efforts"
- Comm of Health can abandon

"+ upon implementation of" + "including any civil penalties + atty fees"
- ¶2 → add a cont for I/G says RTar
- add subdivision (4) → "any damages to N. Resources"
- ¶2, omit release after performance in 2nd sentence
- ¶3 OK
- ¶4 → add SLP + Hopkins (w n-c n.a) 100 p/w 3 m/w 150 su/wk prey (2 w/wk)
  - of creosote, cab tar, etc. and but not limited to PAH, phenols
- ¶5 delete "or take any action authorized by fed or state law" delete "meet → fail to maintain compliance w/ this C. Decree"
  - put in remedial

---

Call Paul Rivers tomorrow after talking to Vendl

ALSO: submit boilerplate for CH2M-Hill to ERT

Section V: reciprocal is OK but is superseded by Case Mgt Order
Section X: delete
Section Y: apply to R.Tar also
Section AA: strike this (Pollak says on "in camera"

Section P: State $2 million RT says state would have to show wilfullness; R.Tar will pay for $ for remedy but not
Barr was useful, Hickok was worthless, USGS
Pre-CERCLA $ are not recoverable by feds or state

- R. Tar won't pay $3.5 million
- they have no problem as long as there is a rational + saleable approach
- fed expenses of $694,000 in RT RAP was omitting atty fees, pre CERCLA $ times 80%

- call Sandy Beck
- Clow
- State Plating RIFS
- Albany
- Woodland Meadows
- ECC travel
- CBI
- C. Dow

Reilly Tar
Negotiations on C. Decree
1-9-85

Section O
— RP any agreement w/ SLP & RT should be an enforceable attachment; notice to Reilly to give RT 45 days to mobilize & also no step $ for RT failure to comply; no problem w/ standing behind the assignment

Section P → defer

Section Q
— strike from the C. Decree; no way of limiting such costs; fed & state ought to put this into it.

Hold Harmless Agreement R
- strike; they have had different language
- Gundler says standard language

Section S
- 6th line change "material" to chemical
2d sent: 5th line chem ~~select~~ materials on HS, ~~materials~~ at, to, from or in the vicinity of the site; strike "contaminants or other pollutants" from end of 2d sentence → their concern is conformity w/ the release language

Section T
— unless ~~an~~ specific exemption is granted by the agency administering such regulation

1st ¶ 2nd sentence : 2 masters problem again
— strike RA + Director

2nd ¶ + 3rd ¶ ⇒ RT says delete
- confusing w/re to subsequent permit appeals
- they don't mind if Magnuson appeals permit but he probably doesn't have jurisdiction
- also, the statute speaks for itself
- retain last ¶ but strike "public responsibility" + add "as his C. Decree". ⇒ AGREE that we add language to say "consistent w/ the statutes & regulations they administer"; ADD MDH

## Section U

- 1st sentence, add "the cities of SLP + Hopkins to 4th line
- , add "in line 7 after "action" : w/respect to known or potential hazards
- RT is looking for a release upon payment ∴ delete 1st subparagraph (a) because settlement policy says they can be released; its not really a release they want the lawsuit to be over
  - add SLP + Hopkins to language
  - delete "cited in the complaints" ⇒ no can do
- top of page 31
  1) known to "or alleged by"; change ~~[illegible]~~ to "creosote, coal tar, + their chemical constituents"
  2) same changes ↑ + also add "or which is reasonably foreseeable" ⇒ RT backed off
  3) insert "all" at beginning + add SLP + Hopkins

Reilly Tar
1-8-85
Hydro Expert Meeting

## Agenda

W-23 admissions to be done by Friday by D. Crisman, then copy to AG, Simonette, DOJ
Covers gen. construction to geol. to cleanout.
Get admissions' response from RT + give to experts.

Graphics
Large site map, then overlays, cf. RTar ~~overlay~~ photograph
Computer graphics give 2 dimensions showing the plume or 2 dimensions w/ peaks ↑ w/ concentration

Depositions
- Tomorrow PM discuss timing of depositions w/ R.Tar
- we say experts deposed where they live ∴ Mercer in D.C.
- Mercer 2-11 to 2-13 is out; also end of 1/85
- next week to 3/22 (Mercer + Hult 1st wk in 2/85)
- 1st wk in Feb 4-8, 15th, 25th-27th are OK for Mercer
- OLAF →, M, W + F are OK

Settlement
R.T. RAP as soon as we give NPDES info
- PDC/J → RT says detection @ point of use + EPA/MN says no further spread anywhere ∴ we say at least 4 monitoring wells to verify gw model + to track contaminants; RT says wait 'till it goes bad

done by RT by next wk

RIFS: scope of work → to HQ on 1-10 ⇒ 1-31 = compile existing data (1/2-1/3) → more sampling (the rest of it)

Techlaw + LMIC (Land Mgt Info Center) have put together the data base + put it on Techlaw's computer but did not check the validity of the data; sample profiles have been done by Dennis Foerst (CH2M-Hill) of 2-3 samples per aquifer.
- any data referenced by Hull should have profiles done; Accuex data will all be profiled by them

Data: RT probably won't contest chain of custody but rather than QA/QC: Hydraulic data ~~will be~~ was relied upon by ERT ∴ RT probably will accept the validity of it in QA/QC as well
Experts have to tell us what they're relying on
2/1 is cutoff date for reg for admissions but we may ask for an extension

Ask Liz what happened when down upstairs

Fact Witnesses: site people, cleanup people

- D/P → RT says they're already bad ∴ do nothing; fed/state says do whatever can reasonable be done
- swamp → no direct contact ∴ Hwy const
- Simonette: consider value of natural resource from a negotiation standpoint as well as for phase 2 of the case

⇒ Accurex data collected last month (3 samples) w/ results in a few wks (starting today) → see map

D/P → long discussion on remedy
- Bitter said 100 yr problem; why is it a problem? He said we'll write off or lose something: what? Why not design a system wh hydraulically controls the plume?
- Thompson to get inorganic constituents, give to Sierks + give to Karnow
- pp 40-42 of Hult/Plomkach report relates to ratios of conc in ~~SLP~~ RT 23 to SLP-15 wh are USGS samples analyzed by MRI
  - aqueous constituents by Hill, Monsanto + Accurex we do have + can be used instead of MRI

Actinal water coefficient w/ re to partition between aqueous + organic phase

- Accurex data will be 10x lower detection level

Reilly Tar
Discovery Negotiations
1-9-85

ES, BC, MW, DH, DC, SS, BS, EM, E Thompson

General Comments

1) what kind of questions can be given to the expert w/re to what the W based his opinion on.
   - the fact relied upon are discoverable
   - the area of testimony is "
2) analytical data
   - expert reports relied upon certain data
   - the only data in question is MDH '78-79 data in house w/HPLC because they're inconsistent w/ the other data developed. They need to look at the HPLC protocol first.
   - Hill, Capsule labs, etc → ∴ say data from 1980 → present stipulate as admissable
   - HPLC protocols by 2-1-85
3) prior drafts of expert reports: are they available

IT
OR

4) RT wants the documents on his list wh he gives us today

Shindell & Spitzer's expert reports aren't in yet. Spitzer is an epidemiologist (heads up McGill University) wh he will use if Karnow resurrects the breast cancer scare

MD → toxicologist

- brief written summary of in-house experts
- they have too many toxicology experts & will complain to Magnuson

Admissions #1-3 → we'll be more specific
#4 → OK
#5 → wh opinions aren't shared by RT?
#6-8 M. Wohaske will get back to DH
- if RT has industry documents, we're entitled to them

Depositions: ① Sanchez + Lawson : Boston
Santodonato : Syracuse
Gregg, Craun, Andelman
} 1st full wk in Feb/85

RT → Thompson + Selkirk first ; they're waiting for feedback
→ they also want dep maybe of Gary Englund who did memo on perf criteria @ MDH
→ they also may want to depose some fact witnesses

Joslyn, vouchers
guidance

December 19, 1984
Reilly Tar
A

1. CW is a referee w/a cattle prod
2. Shakman describes bifurcation of case
3. Heid : summary of CERCLA
   Shakman
   Popham : relies on fed + state
   Gary Hansen : City of Hopkins
4. Schwartzbauer : 5-83 ERT Report to govt + public + leaves the forward (pp 18 ...)
   - explains R. Tar operation
   - PAH are ubiquitous in the environment ; 13 yrs of drinking SLP water = one charcoal broiled steak
   - low levels, ppt ~ 1 sec / 32,000 yrs.
   - no real hazard
   - quotes N.C. group that chemicals are guilty until proven innocent
   - explains SLP issues + prior state action +
   - unconst = due process if R Tar was not negligent
5. Heid : rebuttal of ES toxicology speech saying Congress was conservative ; also, U.S. S.Ct. said Congress can make laws retroactive if there's a legis. purpose
6. Shakman : health risk of SLP compared to other cities
7. Coyne : 595 to 740' of coal tar, also surface discharge into swamp ; phenols + heavy metals

History of Settlement Negotiations

1. ES : lots of progress has been made & RT will build GAC treatment plant contingent upon ; general agreement to plug some wells ; RTar agrees some fed costs reimbursement may be legal but not state costs, esp. atty fees.
   - upfront costs are RT & later costs (5 yrs) of O+M → SLP
2. DH : - no dichotomy between tech & legal (don't separate)
   - SLP 15 & 10 are covered by the GAC but they're other problems
   - our past experience has been successful
   - problem of SLP → O+M
3. SS : RFRA yesterday to RT
   State costs
   We may be able to set such costs aside for separate resolution (DH, ES)
4. CW : no rules ; he can arbitrate
   conf calls are OK

Case Mgt. Order
- # 6 → experts for trial by 12-7
- Bitter & Grundler → short summary of their testimony
- Riner, Simonette, Hansel → ltr. to RT → 12-31 state
- 12-31 add. experts is OK for us → 1-14 feds

- lawyers meeting to discuss discovery 2nd week of January to discuss discovery 1-9-84

Meeting of feds + state re: Reilly Tar 9/22/83

- videotape of Schwartzbaer's/Tomlyons proposal to SLP city council
- 9/82 ERT work begun @ $1/2 million
- Jay Heffern, Shakman, Coyne, Hansel, Pulford, Klepinger, Reiner, Hird, Bitter, Pankanin

Review of past few days (Bitter)

- Kimble, Selkirk, Will Wood, Thompson
- most likely in RT process
  " " health risk + capable of analysis
- list of compounds for proof
- carcinogens are known
- "other" cmpds' health risk is not yet known
  20-25 tumor promoters or mutagens
  - one worse
- he will compare files to be certain
- RT says a complex mixture of the two types is better
- $CH_2M$-Hill will look at chlorinated compounds
- ERT doesn't consider tumor promoters as a health concern
  1. look at MN background levels compared w/ SLP
  2. tumor promoters + mutagens
     100,000 - 400,000 nanograms/l which is 1000-4000 times greater than
  3. model work
     - 10,000 ng/l is worst we've find
     - ADI → acceptable daily intake
     - Selkirks work can be done in three weeks
     - Cincinatti will do the work

④ past exposure to the populace
⑤ GAC is BAT
⑥ chlorinated or oxidated by-products

Other remedies (5 areas)

1. drinking water:
2. groundwater
3. source removal + control
4. multiaquifer wells
5. past costs

$5.8 million total

Assumptions
- economic assumption: effective % rate of 2% bak int - inflation
- 25 yrs replacement of physical plant (Reilly says 5% + 50 yrs)
- 100 years

1. Treatment plant: gradient control to allow #7 + 9 (weekly all summer) to be restarted (wh were closed on precautions
- monitoring 1/4 to 1/2 yr monitoring of all wells in the area
- capital costs ~ $700,000
O+M ~ $100,000/yr

present value $5.8 million

2. Groundwater: ($7.9 present value) 200 gal/min
- gradient control: Mt. Simon/Tinkley maybe, I-Golesville (W-300, W-105) yes
600 gal/min
St. Peter (2 monitoring wells, 1 potentially pumping well) 400
Platteville (2 gc wells) 100 gal/min
Drift (2 pumping wells) (8 monitoring wells) 100/min
SLP 10 + 15 + 4, old SLP #1
P.D. Chien (1800 total, 1200 drinking) Methodist
- treat w/ ozone but say GAC

3/4 to 2/3 of total costs

# APPENDIX A

## MAJOR COMPONENTS OF CREOSOTE (5)

### INORGANICS

Sulfur
Ammonium thiocyanate

### HYDROCARBONS

Alkanes (c 18-28)
Cymene
Dimethylbenzene
Trimethylbenzene
Tetramethylbenzene
Indan
Hydroxyindan
Indene
Hydroxyindene
Methylindene
Dimethylindene
Diphenyl
Methyldiphenyl
Dimethyldiphenyl
Triphenylene
Diphenylenemethane

### PHENOLS

Phenol
Ethylphenol
Ethylmethylphenol
Trimethylphenol
Tetramethylphenol
Phenylphenol

### AMINES AND ACIDS

Benzoic acid
Aniline
Xylidine
Naphthylamine

### PAH

Naphthalene
Methylnapthalene
Dimethylnaphthalene
Trimethylnaphthalene
Tetrahydronaphthalene
Ethylnphthalene
Naphthol
Phenylnaphthene
Naphthofurane
Benzidan
Fluorene
Methylfluorene
Hydroxyfluorene
Acenaphthene
Anthracene
Methylanthracene
Dimethylanthracene
Hydroxyanthracene
Phenanthrene
Methylphenanthrene
Hydroxyphenanthrene
Phenanthridone
Retene
Fluoranthene
Tetrahydrofluoranthene
Naphthacene
Benzoaphthacene
Benzofluorene
Chrysene
Pyrene
Naphthoanthracene

### HETEROCYCLES

Tetramethylpridine
Benzofuran
Methylbenzofuran
Hydroxybenzofuran
Dibenzofuran
Methyldibenzofuran
Hydroxydibenzofuran
Benzothiophene
Methylbenzothiophene
Dibenzothiophene
Indole
Methylindole
Quinoline
Isoquinoline
Methylquinoline
Methylisoquinoline
Dimethylquinoline
Dimethlyisoquinoline
Tetramethylquinoline
Carbazole
Methylcarbazole
Acridine
Hydroacridine
Napthofurane
Phenanthridine
Benzoxanthene
Napthobenzofuran
Napthobenzothiophene

# APPENDIX B

## COMPOUNDS IDENTIFIED IN ST. LOUIS PARK GROUNDWATER (4,5)

### HYDROCARBONS

Pentane
Cyclohexane
Benzene
Ethyl Benzene
Methyl ethyl benzene
Trimethyl benzene
Triethyl benzene
Pentamethyl benzene
Hexamethyl benzene
Indene
Dinydroindene
Dihydroindeneone
Methyl indene
Methyl dihydro indene
Dimethyl dihydroindene

### PHENOLS AND ALCOHOLS

Phenol
Methyl phenol
Ethyl phenol
Dimethyl phenol
Diethyl phenol
Trimethyl phenol
Ethyl methyl phenol
Methyl propyl phenol
Phenyl propanal
Biphenyl
Biphenylol
Xylene
Toluene
Butoxyethyoxy ethanol
Chlorinated hydrocarbons
Methylene chloride
Trichloroethylene
Tetrachloro ethylene

### PAH

Naphthalene
Methyl naphthalene
Ethyl naphthalene
Dimethyl naphthalene
Naphthalenol
Methyl naphthalenol
Phenyl naphthalene
Tetrahydro methano naphthalenone
Fluorene
Methyl fluorene
Acenaphthene
Acenaphthalene
Anthracene
Benzanthracene
Dibenzoanthracene
Phenanthrene
Dihydrophenanthrene
Dihydrophenanthrane
Methyl phenanthrene
Flouranthene
Benzofluoranthene
Pyrene
Tetrahydropyrene
Methyl pyrene
Indeno pyrene
Benzopyrene
Phenylene pyrene
Chrysene
Perylene
Benzoperylene

### HETEROCYCLES

Indole
Benzothiphene
Methyl benzothiophene
Dihydro benzothiophene
Dibenzothiophene
Benzofuran
Methyl benzofuran
Quinoline
Carbazole
Acridine

### AMINES, ACIDS

Aniline
Methyl aniline
Benzonitrile
Dimethyl benzaldehyde
Methyl Benzoic Acid
Benzene acetic acid
Amino naphthalene
Naphthalene carboxylic acid
Aminobiphhenyl

9/22/83

TABLE I.

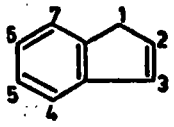
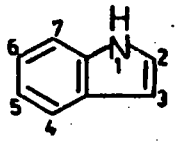
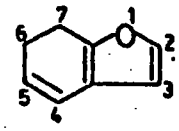
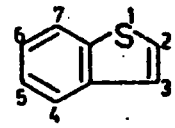
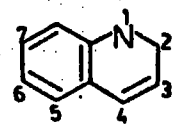
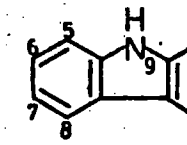
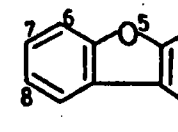
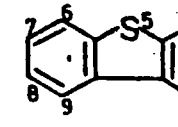
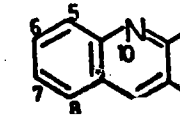
PHYSICAL PROPERTIES OF PAHs

| Compound | Formula | Molecular Weight | MP°C | bp, °C | Water @ 25°C Solubility, mg/l |
|---|---|---|---|---|---|
| 1-methylnaphthalene | $C_{11}H_{10}$ | 142.2 | -22 | 240-243 | 28.5± 0.3/[9] |
| 9H-fluorene | $C_{13}H_{10}$ | 166.22 | 112-115 | 298 | 1.98 ± 0.04/[9]<br>1.685 ± 0.005/[10] |
| dibenzofuran | $C_{12}H_8O$ | 168.2 | 81-83 | 285 | |
| anthracene | $C_{14}H_{10}$ | 178.23 | 212-214 | 340 | 0.073 ± 0.005/[9] |
| phenanthrene | $C_{14}H_{10}$ | 178.23 | 99-101 | 336 | 1.29 ± 0.07/[9]<br>1.002 ± 0.011/[10] |
| 1-methylphenanthrene | $C_{15}H_{12}$ | 192.26 | 123 | | 0.269 ± 0.003/[10] |
| fluoranthene | $C_{16}H_{10}$ | 202.26 | 107-110 | 384 | 0.26 ± 0.002/[9]<br>0.206 ± 0.002/[10] |
| pyrene | $C_{16}H_{10}$ | 202.26 | 149-151 | 404 | 0.135 ± 0.005/[9]<br>0.132 ± 0.001/[10] |
| chrysene | $C_{18}H_{12}$ | 228.29 | 250-253 | 448 | 0.002 ± 0.00017/[9]<br>0.0018 ± 0.0001/[10] |
| benz[a]anthracene | $C_{18}H_{12}$ | 228.29 | 161 | | 0.014 ± 0.0002/[9]<br>0.0094 ± 0.0001/[10] |
| benzo[a]pyrene | $C_{20}H_{12}$ | 252.32 | 178-179 | 495 | 0.0038 ± 0.00031/[9] |
| benz[e]acephenanthylene | $C_{20}H_{12}$ | 252.32 | 167 | | |
| benzo[k]fluoranthene | $C_{20}H_{12}$ | 252.32 | 217 | | |
| perylene | $C_{20}H_{12}$ | 252.32 | 277-279 | 503 | 0.0004 ± 0.00002/[9] |
| benzo[ghi]perylene | $C_{22}H_{12}$ | 276.316 | 272-273 | | 0.00026 ± 0.00001/[9] |
| indeno[1,2,3-cd]pyrene | $C_{22}H_{12}$ | 276.316 | 163-164 | | |

DRAFT

# TABLE IV

## COMPOUNDS AND THEIR PROPERTIES

| | COMPOUND NAME | MOLECULAR WT. (g./mole) | MELTING POINT/ BOILING POINT (°C) | WATER SOLUBILITY (Moles/l) | OCTANOL-WATER PARTITION COEFFICIENT (logKow) | IONIZATION | λ max nm (log ε) |
|---|---|---|---|---|---|---|---|
|  | INDENE | 116.15 | -1.8/181 | $1 \times 10^{-3}$* | 3.22 ± 0.12* | --- | 249 (3.97), 279 (2.72) 2.90 (2.26) |
|  | INDOLE | 117.4 | 52/253 | $1.58 \times 10^{-3}$(33) | 2.13 (164) | pka = 16.97 pkb = -3.5 | 218 (4.44), 271 (3.79), 287 (3.66) |
|  | BENZOFURAN | 118.1 | -18/174 | $3 \times 10^{-3}$* | 2.67 (163) | --- | 245 (4.0), 278 (3.3), 285 (3.3) |
|  | BENZOTHIOPHENE | 134.2 | 32/221 | $9.7 \times 10^{-4}$(86) | 3.2 (163) | --- | 303 (4.06), 290 (3.97), 215 (4.84) |
|  | QUINOLINE | 129.16 | -15/238 | $4.7 \times 10^{-3}$(86) | 2.05 (164) | pka = 4.94(155) pkb = 9.22(166) | 275 (3.51), 299 (3.46), 3.12 (3.52) |
|  | CARBAZOLE | 167.2 | 245/355 | $6.2 \times 10^{-6}$(86) | 3.41 (129) | --- | ---------- |
|  | DIBENZOFURAN | 168.2 | 86/287 | $1.8 \times 10^{-5}$(120) | 4.12 (163) | --- | 217 (4.5), 250 (4.3), 280 (4.2), 285 (4.2) |
|  | DIBENZOTHIOPHENE | 184.27 | 100/332 | $2.9 \times 10^{-6}$ | 4.38 (162) | --- | 234 (4.9), 256 (4.3), 262, (4.1), 286 (4.2) |
|  | ACRIDINE | 179.21 | 111/346 | $2 \times 10^{-4}$* | 3.30 (93) | pka = 5.63(93) pkb = 8.57(166) | 240 (5.2), 340 (3.8) |

* Estimated methods described in reference 101.

Table 8. Percentages of PAH's in whole creosote and in samples of creosote from soil in a wood treating plant.

| Creosote component | % whole creosote | % creosote in soil[a] |
|---|---|---|
| Naphthalene | 17.0 | 0.6 |
| 2-Methylnaphthalene | 6.5 | 0.3 |
| 1-Methylnaphthalene | 3.5 | 0.3 |
| Biphenyl | 1.9 | 0.2 |
| Acenaphthylene | 0.5 | 0.4 |
| Acenaphthene | 7.8 | 1.1 |
| Dibenzofuran | 5.2 | 1.8 |
| Fluorene | 6.0 | 1.7 |
| Phenanthrene | 19.4 | 7.6 |
| Anthracene | 2.52 | 4.2 |
| Carbazole | 5.1 | 2.1 |
| Fluoranthene | 11.8 | 30.1 |
| Pyrene | 8.4 | 32.8 |
| 1,2-Benzanthracene/Chrysene | 4.2 | 16.9 |

[a]Average of 32 soil samples from a wood treating plant.

Based on 100% PAH

Neutrals

ngs

2 naphthalene *

3 phenanthrene *

acenaphthene *

acenaphthylene

fluorene

4 benz(a) anthracene *

pyrene *

chrysene *

7,12-dimethyl-benz(a) anthracene

fluoranthene *

3-methyl cholanthrene

5 BaP *

BeP *

dibenz-a,h-anthracene *

benz-b-fluoranthene

benz-j-fluorathene

BaP-3,6-quinone

6 indeno-1,2,3-c,d-pyrene

dibenz- ae -pyrene
ah
ai
} one *

benzo-ghi-pyrene

## Bases

Carbazole *
acridine *
indene
quinoline
dibenz-c,g-carbazole *
benz-c-acridine *
aniline
1-naphthylamine
amino-biphenyl

## Volatiles

toluene
xylene
ethyl benzene *
trimethyl benzene
triethyl benzene
methyl ethyl benzenes
naphthalene *
thiophene
benzofuran
pyridine
trichloro ethylene *
indene

## Acids

phenol *
cresol *
trimethylphenol *
hydroxy-naphthalene
hydroxy-biphenyl
2,4,5-trichlorophenol
3 tetrachlorophenols
pentachlorophenol *

biphenyl *
pinene
dibenzofuran
thiophene
benzothiophene
dibenzothiophene

~~5/4/83~~

7/22/81 $280,000 Special Purpose Assistance to MPCA
~~9/81~~ Amended to revise project ~~sp~~ scope to $400,000
9/22/81

- original grant: 7/22/81 & amended 9/22/81
  Task 1A extent of contamination in W-23 } prepare P+S for
  1B " " in W-105 (sugar beet) } abandonment or
  2 off-site well investigation + abandonment reconstruction
  3. pilot plant study; P+S for water treatment plant @ W-15

- revisions: due to Weston critique ~~[illegible]~~

5/1 to 8/1 → 1A: no new well @ W-23 until found to be necessary
1B: wait until work on W-23 is done
5/1 to 8/1 2: no change
7/1 to 5/1/83 3: extensive literature review on water treatment for removal of coal tar derivative contaminants; assessment of WQ @ 11 wells for PAH + other contaminants (phenols, N heterocyclic compds); bench tests; pilot plant studies on the various alternatives
P+S for const a water treatment plant; cost effective analysis

Tasks 1+2 (W-23) → old supply well
→ Hickok + Assoc ($196,000) → 3/23/82
→ done by 8/1/82
→ all info from State = confidential
→ prior approval before any communication or release of documents
→ 909' well = W-23
→ debris to 595'
→ plug of coal tar to 1' → below is?
→ packer to 250' to protect P.D. Chin
→ test the packer
→ install 590' of casing
→ core through + get samples of tar + fill material to 10' below well bore
→ log the ~~[illegible]~~ 10' of new bore
→ inspect w/ down-hole TV

→ sample PD Chier
→ if need to go on then take samples at 50' intervals
→ analyze samples
→ prepare ~~PAH~~ P&S for abandonment + reconstruction as a monitoring well
→ dispose of coal for pursuant of state + fed regulations

Sugar Beet Well (USGS #105) → NW of (Walker + Lawson Int)
→ well debris cored logged + sampled to 200' depth using I-A method; if clean then can use rotary method
→ clean it + pack it to 500'
→ little info on it but at least 950'

Recovery of P.D. Chier Jordan Core
→ about 50' from W-23 (2-3" in diameter) + make it a well into the PD Chier - Jordan
→ continuous sampling
→ 260-460'
→ analyze + classify
→ pump Jordan for 24 hrs w/ 4 spaced samples
→ seal Jordan borehole to bottom of PD Chier
→ pump test PD Chier + samples for PAH's
→ P&S for permanent well abandonment for use as a monitoring well

TGSK II
→ locate + get info on multi-aquifer wells esp. Platteville + PD. Chier
→ prioritize as to flow + degree of contamination
→ 1° ~ Hwy 7 + La. Ave + east to France Ave.
→ search boundaries: (N) → W 28th Street, France Ave (E), W 40th + Excelsior Blvd (S), Virginia Ave (W)
→ door to door search of homes + industries
→ file search everywhere else (Edina, SLP + Hopkins) files, bldg. permits, water records,

→ state + fed agcy records
→ local well drillers + city engineers
→ develop comprehensive well abandonment program
→ weekly verbal reports + monthly progress reports to Bartelt + Parkin

Weston 8 month contract (3500 hrs)
→ PhD's + Masters
→ Dr. Shoenberger 1° guy → Senior Principal Contact PHD in chemical + env. engr.
→ contract out of Cincinnati, contract mgt. div.
→ confidentiality agreement signed
[Scope of work]
→ prepare an EA to determine if an EIS or NSI is appropriate
→ three separate assessments based upon 1.) Hickok report, 2.) Tasks I + II + ③ Phase III
→ they will cite deficiencies
→ use existing reports as well as published + unpublished data
→ draft EA will be based upon the alternatives in the Hickok report + will include assessment of any soil treatment alternatives
→ rank each alternative based on impacts + costs
[Review of Hickok Report]
① consider other contaminants besides PAH
② carbon may not be the best method
③ consider other treatment methods w/ Hickok rejected
④ adsorption efficiency of carbon for PAH removal is < the assumed criteria
⑤ carbon regeneration is not cost effective
⑥ need better technical procedures
⑦ limits for PAH need to be reviewed
⑧ need more data on rates of adsorption + desorption of PAH in each strata
⑨ need more review of landfarming as a possible alternative
– additional study the Hickok report will be done in the future

- December 1981 progress report: preliminary comments on Hickok report are done; 50% of literature review is done
- April 1982 progress report: comments given to MDCA regarding fixation, encapsulation + solidification as on site alternatives; draft EA on Hickok report submitted in March; comments received in April; final expected by 5/31/82; OTC + MDCA works to evaluate other options; Weston did a report which outlined potential technologies + estimated costs for ~~pilot~~ pilot plan + operation to be evaluated by OTC in 5/82
- 5/7/82 Evaluation of Applicable Treatment Technology:
  ① biological processes ② land application ③ physical/chemical ④ off site disposal ⑤ off site recovery ⑥ in-situ leaching
  → gives costs of pilot plan ($5-50,000) as well as the applicability in the peat, concentrated hydrocarbon layer + glacial drift as well as for 1° source, residual ~~solids~~ streams (solids + liquids) for each area.
  → 3 source areas:
    ① peat → 15 acres of peat + muck located 1° along the ⑤ edge of the site + north of Lake Ave. (up to 20 feet deep)
    ② concentrated hydrocarbon layer w/ creosote smell + very brown color ~ 30-50' in depth
    ③ glacial drift → 60-80' depth soil formation throughout the area, including the middle drift aquifer

1/78 → 12/11/80 = SF Credit period

Amendment of Cooperative Agreement (Superfund) → 10%

3/31/82 letter from Bartelt to MPCA recommending amendment of the Cooperative Agreement to reflect the changes in Task 3 due to the water critique

Draft – Cooperative Agreement being prepared by Paul Bitter
→ proposes 2 remedial activities

start 7/1 ① well abandonment : 8 known + no more than 50 total

start 9/15 ② soils study : extent of contamination; soil/water relationships + evaluate + identify remedial alternatives

– RCRA cooperative agreement for I.D. of wells is underway; subsequent work will be to complete the survey, + plan + implement the abandonment

Task III

3/1/82 request for credentials published in state register
3/23/82 14 submittals
4/9/82 narrowed to 5
4/16/82 advised to submit proposals by 5/3/82
5/17/82 interviews
5/26/82 selected CH2M-Hill
7/1/82 contract signed + work begun

Technical project tasks

1.) literature review
2.) meet w/ State to discuss proposed treatment alternatives + protocols, testing procedures, etc
3.) chain of custody followed
4.) assess W.Q. of 11 wells for PAH + other compds
5.) outline program for bench testing + pilot plan
6.) define design parameters
7.) assess impact of fluctuations in contaminant loads
8.) do the bench testing
9.) submit + implement plan for pilot tests on selected treatment options
10.) outline scope of work etc + PES for water treatment facilities

11.) review SLP investigation + cost estimates for alternate water supplies + fill in gaps

12.) investigate + give cost estimate for pumping plans 1, 2 + 3 + treatment schemes A, B + C (Hickok)

13.) investigate + assess the effects of existing water treatment at well #15 (aeration, filtration + chlorination)

Selected on a total score (5, 3, 1) w/ weighted criteria:

literature review (2)
lab analysis (5)
bench testing (5)
pilot testing (3)
engineering (3)
treatment at well #15 (1)
alternate water supplies (1)

- 7/78 to present USGS (6 interim reports)
- 80-81 Hickok
- Weston EA for Hickok + tasks 1, 2 + 3

MPCA

7/22/81 200,000
9/22/81 200,000

Task 1 → 6/23 + Sugar beet well
5/1 → 8/1 2 → well investigation + abandonment
7/1 → 5/83 3 → water treatments
$CH_2M$ - Hill
- add on expert

Peat study → Dave spoke w/Bitter ~~[illegible]~~ 9/1 → K
10/1 → start

Soil treatment study
- 7/1 request for proposals
9/1 study begins
8/1/83 study complete
1/1/84 work starts
6/1/84 work ends

# 68-02-3168

for determine presence of coal for der. beneath forms RT site SLP, Mis

GCA Contract : soil cons from 25 locations
5/27/82 → 8/30/82 ↳ 150 total analyses

"Analysis of Env. Samples for EPA, Region V"
6 SQ water, 77 water 11 sludge, 150 soil

K# 68-01-6316

~~9/22/81 → 8/30/82~~ Work Plan proposed
↳ 1-82 to 8/82
- 9/22/81 work plan
- 1/11/82 sampling proc. for MS + MN, Mahon
- 2/26/82 rec'd by GCA
- 4/20/82 some water finished

# GCA contract

6 quality control
77 water + 11 sludge samples
150 soil samples
80 water samples for PAH + other contaminants

4 water samples from SLP Munic. wells
11 " " from Mississippi River for PAH
11 " " " " for other chemicals
15 " " from Metropolitan Waste Treatment Plant
4 sludge samples " " "
2 soil samples from ~~[illegible]~~ Rilly Tor site

# Reilly Tar

1. Interrogatories + production requests are done for now and are in the computer + ready to access by 3/15.
Maynot file the ~~SS~~ interrogatories.

2. Deposition of
   a.) Finch, GM of site from 1960 to closing in MN on 4/26
   b.) Lescher, VP + gm of refining division, also officiant + T.E. Reilly on 5/24 to 5/26
   c. in Indianapolis
   c.) Wm Justin, env. engineer for Reilly
   Reilly's experts
   Reilly's neighbors + former employees
   d.) their discovery

3. Witnesses
   - geologist (hydro)
   - toxicologist
   - chemist
   - epidemiologist

   experts

   - Marc Hult
   - supporting cast
   - Reilly's guys

   fact witness

4. data QA + QC
   - Kosakowski

EPA HQ

I Herman Gibb → 3 names  eppidimiology + toxicology
Contract for names → 3 wks
Life Systems
↳ ◊ Shamrock

II Barbara Alta → the brach chief there

SLP met w/ Kos + Copper + said
they want $ for look up of water system
to their neighbors

Mim hired Aspen Corp + Cortal Data to develop software for their file + del et al developed a key word system w/ a 3 letter code for each word. There will be several hundred categories
- Aspen will train their people in Washington
- Ken Stevenson will access the system
- we
- Jack Soul who wanted to do an epidemiology study + works for EPA + split samples 1/2 to ~~CERT~~ Scarle + 1/2 to V

Experts

Steve Reid (chem eng for NPCA) went through all Reilly production report + ∴ knows the process best + ∴ he should set up (+ is in the process of doing it) a process engineer.

Bob Griffen (hydrogeologist w/ UofI + ISGS + soil chemist) has worked w/ neutral ungd organics (eg PCB or ONC) and as PNAH + would talk on transport. NRI is sampling "virgin" prod for background info. . Soil transport exhibition

John Eigman is the only person from Hickok working from the State + the project is to come up w/ solutions

Kirk Brown out of Texas A+M has done work w/ land farming of PAH + is currently working on a project in Texas

Cornelia Georgia creosote plat w/ creosote on distribution of top of ~~aquifer~~ aquifer.

Peter: we need the financial reports but strict that 16 million once and 2 1/2 million/yr

He would need the same info as for the SEC
OK Report wh would be easy for them to provide.

Superfund
- getting close to an agreement of the State
so State can enter into K
RCRA 8000 grant w/ 5% State match
- A95 review period is involved
- ~ 30 days from now costs will be incurred
- grant agreement to HQ by end of
next wk.

- maybe file an amended complaint by the end of May

June 1 amended complaint
107(a) 106 + 107(c)

Hearing on Motion to Dismiss

E.S. - 9/3/80 case commenced by U.S. + parties agreed to continuances + judge did so on its own motion.

Note { 5/81 State Amended Complaint to add SF
{ 9/81 Fed " " " "

- Court has to interpret SF legis history which is tough because H.B + S.B were very different + what ended up was a compromise bill w/ no legis hist. for that bill except for the debate on the day of passage on the floor

- Facts are based on aff't of Carl Fisher + David Gies:

- 1917 - 1972 used for a wide variety of uses such as road paving, weed killing, cold syrup, but 1° creosote oil for wood preserving only is registered w/ EPA

- swamp outside of site in SLP
- Well #1 drilled in 1930 + Reilly constructed a phenol extraction chain + settling basin to remove some of the wastes by gravity, also later a straw filter
- 1970 MPCA sued but settles in 1972 but not dismissed
- 1978 MPCA filed amended complaint pursuant to Rule 15
- SLP left Reilly to Cornelse + Reilly left so that it could be re-developed for condos

Judge - Not tagged to 1970 case?
- ES said "still pending"; exchanged interrogatories + thousands of documents

- DAA's were found in gwater
- wells closed if >38 ppt
- no standards
- all parties agree that SLP drinking water is presently OK and that, since 1972,
* Reilly Tar has done no "loading, etc."

the Argument

SUPERFUND

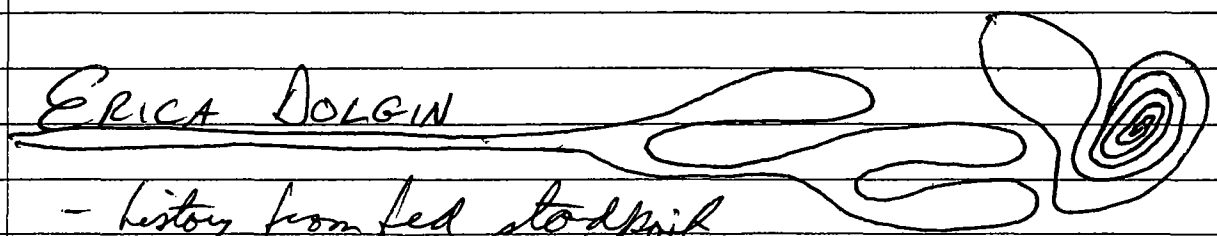
- sections should be read as a whole
- §107 is the "strict liability" section
- §104 response actions
- §105 Natl Cont. Plan

- Π's are here pursuant to §112 for claims under §111
- §111 says fund can be used for NR damages + §104 response ~~[illegible]~~ costs
- all resp. costs must be consistent w/ Natl Contingency Plan
- claims must be for costs consistent w/ §104 + the Natl Cont. Plan
- this req. is not mere cosmetics
- Π can do anything they want but can't be reimbursed w/o comporting w/ NCP
- sub H/~~[illegible]~~ of §105
- NCP would provide some guidance
- Π's say NCP is already in place but only applies to spills of oil on the high seas
- there is no "gap" w/r to oil spills, but nothing is effective for gw in SCP
- how would a court judge today whether response costs are consistent w/ the NCL
- dismiss lawsuit w/o prejudice because it is not ripe for adjudication.
- §104 → response actions (e)(1); State must have a site to get rid of waste under SF

- Natural resource damages only pursuant to ~~the~~ NCL after consulting w/ governors, w/ public hearings, etc.
- NR damages is a novel concept

RCRA 7003 + 106 of SF
- similar but w/ a difference
- CWA + CAA had the imm + subst. and. language
- 7003
- §106 was not delegated from the president, ∴ the claim is not valid
- Reilly would like to reserve the constitutionality of Superfund

ERICA DOLGIN

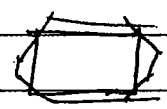


- history from fed standpoint
- will emphasize a few points
  1. NO court cases on point w/ have come to opinion
     - citizen suit case against EPA
  2. NCP
     - most of the §105 is procedural
     - the $200M was for studies etc, rather than "clean up work"
  3. RCRA argument

Steve Shakman
- set forth some facts regarding the problem
- 2.8 ppt for carcinogens + 28 for non-carcinogens
- demonstrative evidence = map of SLP w/ wells 10 + 15 closed ; 15 = 100x sole bal
  wells 7 + 9 closed ; well 4 closed ; 2/81 closed
  Hopkins well #3 (non-carc. only) ; well #5 closed
- 6 of 14 wells in SLP closed + one in Hopkins
- sets forth well abandonment program, well #23 work, plans, etc that have been done to date

- removal of source area; g control wells
- Reilly Tar is a top nat'l priority site

SUPERFUND
- look at plain meaning and then the legislative intent
- Appendix A is helpful but Appendix C is even more helpful (Senate Bill 80)
  - HR 96-1016
- NCPlan
- SR 96 page 48 in middle of page is BEAUTIFUL
- the existing NCPlan (40 CFR 1510)
- if you're unsure, postpone until time of final

RCRA
- Price decision is closest to this one
- Vertac case
- Diamond Shamrock 
- we do have an imminent and substantial endangerment

Allen Hinderaker
Vesely
Rustic Oaks (IMC Corp)
Oak Park Village Assoc

Schwartzbow Rebuttal

Judge: "How do you distinguish this case from Price?"
A: I don't, but it's a lousy decision

— out of trial + inappropriate to argue the merits, eg cancer causing suspected
— some PAH compounds are ~~suspect~~ human carcinogens

JUDGE

"Off the record" → you govt. agencies should go full bore
→ courtroom remarks

Stakeman will submit ~ 50 pages of NOP

2. The <u>remedial work needed</u> at the site depends upon the information set forth in #1, above, relating to the nature, extent and toxicity of contaminants. Such information is useful in determining what water or soil needs to be removed or contained. We currently have contracted w/ Hickok to come up w/ alternatives.
If we determine that the contamination flow in the aquifers needs to be halted from spreading, it appears that gradient control wells are the only conceivable solution other than to look to alternative sources of clean water, such as surface water. <u>The issues relating to gradient control wells are:</u>

a. what wells to use, where should additional wells be placed and what pumping rates for each.
b. How do you dispose of the water which results from pumping
   1. discharge to treatment system,
   2. " to Mississippi River or other,
   3. <u>treat</u> prior to discharge
   4. other (?)
c. How will this affect the cities' water supplies
d. How well will this system work
e. How much would such a system cost

The <u>issues relating to contaminated soils</u> relate to the concern that contaminants may be released from them into the groundwater such that the soils represent an existing or potential source of contamination.

6/16/82

1. SF letter → REL + P.B. to draft + send to everyone + Dolgin gets comments + sends out to Schwartzbaur
   1. water treatability study
   2. soils " "

2. Reilly Tar negotiation strategy
   - don't send them any data, studies, etc. w/o contacting me.
   - send them information only to the extent that they will cooperate but split samples

---

1. Visit w/ Dr Gary
   - cell transformation (visually) morphologically wh has neoplastic properties which could cause tumor formation
   - no controls, etc. ∴ not usable

(W-38) sample
   - mixture gave the same curve as w/ B(a)P
   - he had MDH analyze w/ HPLC but the technique may not have been very good
   - this method has potential
   - Ames assay in 2-3 days → 1st line → good to 90%
   - cell transformation takes longer (3-6 wks) ← ~$800
   - false negatives 10% of the time

$2-3=400 → Ames - very reproducable, sensitive & correlates w/ carcinogenicity
   - bacterial assay
   - if you go 2nd line you need SCE or DNA repair mechanism in conjunction w/ cell transformation

4 strains of salmonella in the Ame's test because of

⊕⊖ + solvent controls
differences in different molecules.

(2) 6/8 letter from Reilly Tar asking if we have any info regarding molecular structure of PAH (after they saw Hultz chromatograms wh were conjunct)

(3) Expert to testify where the chemicals come from, i.e. ~~the~~ the raw materials, products, by products, etc.

574 → 612 → solid coal tar

- commercial work
- degradation (chem, phys, biological) of coal tar + products + density of it

---

and EPIC to Lin

U of C Med College
Dept of Enc.
3223 Eden Ave 45267

Case Review

Geraghty & Miller on board soon (w/in 2 wks)
- existing K for Drinking Water assistance
- bill Marc Hults money to Kosakowski but he can't pay for studies

Foerst will concentrate on some of the data
Call Foerst tomorrow ~ 8:30 or 9:00

1. Soils samples
   - Hult knows where the holes go
2. - water treatment protocol → Dennis + Brenda
3. W-23 started last wk + pulled out 40' down to 612 (20' went up the pipe) Monsanto, ERT + Soils Testing Group
   - sampling technique is good but after 3 samples it wasn't but its OK 'cause they're so filthy
   - frozen imm. + → Hick OK + Assoc → U. of Iowa Hygenics lab
   - plenty of samples
   - chain of custody OK
   - IOWA lab will send protocols
   - material in 55 gallon drums (generator) behind a locked chain link fence (12 drums)

4. Well ~~water~~ survey → total listing

Treatability in mid-July

July 20

Olin Braids 516-921-6060
Jim Geraghty 301-268-7730
David Hurd 633-5466

Olin Braids has worked on the Koppers Coke case (Doggett) up to 1980 and his firm is still under contract although there have been no billable hours for about a year. He ~~is~~ talked about the chemicals ~~product~~ produced and the geochemical reactions. He dealt w/ gw movement only vis a vis existing data but did no modeling.
He is a chemist but does not do modeling

J + Miller has 9 offices w/ 80 professional ~~from~~ people + a total of ~ 120.
He will look at the report wh he did for Koppers to double check that no harmful conclusions were reached.

B.S. in Chemistry
MS + PhD in soil chemistry
U of I fellowship post-doctoral work
Metro Sanitary Dist for 3 yrs w/ agriuse of sewage sludge
1972 w/ USGS

His PhD work was on soil waxes + lipids (wh you would get w/ benzene, chloroform, etc. extraction)
wh are similar to coal tar derivatives
- he is into the organic components of soil

Colloids may be one of the mechanisms for PAH transport since PAH's are attracted to peat colloids

He has not read any of Hickok's reports on the data, etc..
- peat bogs could account for tarry or boggy smell in the water

Hydrolysis reactions occur w/ organic cmpds in water but PAHs + PNAs don't work this way

James Geraghty

- possible remedial measures + to bind support to major issues + conclusions
- preliminary computer modeling
- gw flow will change w/ pumping rates (general knowledge rather than site specific)
- regional gw flow → M/SP ∴ East
- their report was a separate document wh dealt w/ g. control system

Marc Hult

- detailed understanding stops
- W-10 + W-15 are RT w/ high certainty + 5
- nothing west
- downtown Minneapolis has 50 air cond. wells

Erica Dolgin

- proof + remedy

Geraghty + Hult agree on the facts

- ~~the~~ Rock valley contaminates the St. Peter aquifer but not the PDChien
- the multi aquifer wells are the conduit from the contaminated drift to the PDChien aquifer

- USGS can't testify to remedies

- Tim S. said they need to play devil's advocate
- Hult can do all non-field work for the case; USGS pays for the field work
- enough water data but need more soil borings
- Marc Hult will make a list but will draft it for attorney's purposes for litigation to Erica
- what is the status of our law clerk's research on discovery.

Status Hearing end of August

Olin Braids is not "hot" on AAH's ∴
Mkosakowski will have Life Sciences look for
someone else

500 man hours of effort from S + Miller

---

Warshawsky

Expert call on Thursday 7/29 @ 1:00 CST
Conf. call on the experts
- Warshawsky may be too hot for

MPCA
5 11 ppt of total carcinogenic
3110 → total PAH
↓
Minnehaha
Creek

Time Line

Bobine is a magistrate, pretty good
- can go to judge or appellate
court directly

Depositions: old Rilly (1 or 2)
Lessher
(Justin)
Harner
Armussey
city employee → Chris Churches (city mgr)'s wife (hold)

Experts

Analyses
V-79 + Ames by end of yr

6 mos + 6 mos + 1 mos = 10/1/83

Reilly Tar August 24

Rob Pollak, Carl Lescher, Wayne Popham, V.P. B.M. Ref.
John Craun, Ed Schwartzbauer V.P. Gen. Counsel
ERT Francis McMichael
Dale Wikere, director solid waste mgt division,
Ed Kleppinger

ES - Now that we've got the decision, the court will ask for a discovery schedule.
- RT approach to resolving the perceived problems in SLP + ∴ will present concepts w/re solving the problems in SLP + ∴ McMichael will do it!
- cannot propose a final + comprehensive solution + haven't designed a system to do so
- he has been working w/ ERT for 3 yrs + have brought a real world + pragmatic approach to the problem
- leading up to the thought that RT would prepare a report based upon hard analytical data
- Francis McMichael is head of civil eng. dept at Carnegie Mellon + is an expert @ waste-water treatment

FM - focus → tech issues central to mgt plan to close on problems w/re to PDC/J aquifer water supply problems
- specific problem definitions + sense of priorities as to what should be done first
① trace levels of PAH in water supply wells
- 6 wells in SLP due to ↑ levels of PAH (15-20% of SLP system) ∴ shortfall of water to them
- treat all or some of the raw water to levels deemed safe for human consumption
- "systems" point of view w/ 3 elements
① sources ② pathways ③ exposure

- studies to date have dealt w/ all or some of these 3 elements & FM will address all three
- most cost effective → 1° treat water at the well
  ∴ you need standards which could reasonably be set for PAH's & it is important to come up w/ a number, protocols for sampling, ~~methods for~~ & what to do if sample ↓ standard or ↑ standard
- also consider quality of water in other areas
  eg. Mississippi River

(2) Water Quality Treatment
- PAH are ubiquitous in all media but not to shut down water supplies
- the treatment industry has technology to control the levels of PAH in finished water ∴ the basis should not be raw water
- U.S. EPA (Cincinnati) documented the effectiveness of g.w. & surface water control of PAH w/ different treatment systems
- exotic, unproven technologies are not needed but conventional are adequate (softening, particulate & microparticulate removal)
- exposure: levels acceptable to broad classes of people throughout the country
- he has handouts w/re to levels of PAH in other cities & treatment of thereof (most are surface water supplies
- transport → not a big item w/ RT
  - natural discharge of aquifers is to Mississippi River ∴ no big reason to change that ultimate sink by altering the course of g.w. direction
  - multi aquifer wells act as isolated gradient control wells & each multi-aquifer well should be looked at to see if its part of the problem a

part of the solution:
- sources - what to do to eliminate them + i. contribute to an overall regional cleanup
- contaminated wells are more clearly a problem rather than eg. the swamp area; "pockets" of problems (eg. W-13) hydrocarbon phase can be dealt w/ as spills + could be isolated but the benefits are speculative + may take years
* - contain + remove is appropriate

* countrial would work if standards are OK
- use well systems wh exist in the area even if the water isn't used

---

① surface water use. has ↑ TSS + g.w has ↓ TSS but micro particulates may be ~ the same
- g.w. use has lower DO but higher mineral content

MH → surface water particulates; photo oxydation

ES: drinking water standards should be applicable to all water supplies in the State of MN
- we have to look at the quality of drinking water
- ERT said most of our ideas are good + that our DO loop approach is good
MH - sample at six pts in the train of W-15
- ERT can note comments + so can Monsanto

ES ERT + Monsanto can do a study

MH + FM ⊠ SLP + other wells can be used for product control wells

FM May have to treat the water forever
MH Isn't it a good idea to ↓ the time or amt. of treatment
FM Get rid of any source, but what is a source?
- buried tank
- uncased well
- spill (if you can get to it w/in a reasonable period of time
- removal, treatment (biodegrade), contain + other methods
- swamps (drift aquifer) is a major source & something should be done to control it
- monitor it
- maybe biodegradation

FM + JC

ES $200,000 SF for abandoning multi-aquifer wells?
JC - questions the need for closing certain multiaquifer wells
MH - 9 wells being considered 6/3 Prairie du Chien/other
- has to show EPA that it's cost effective
- industrial wells presently being used would either be abandoned + replaced or repaired
- many private drinking water wells are in the Platteville

Hickok

SLP Call { 1969 SLP Study 1)
1980-1981 SLP treatment study 2)
Remedial Study for State 3)
1982 Hickok well abandonment 4)

26(B)(4)(b) → oppose him being deposed since he is a consultant not called as an expert
1.) after experts are all named
2.) non-trial expert 26B(4)(b) ∴ 1981 study is out as of this time
- written K says he will provide trial testimony + consultation as asked for more $
ES → - he ~~is a~~ was hired to put together a report
SS → - ES can depose Hansel's successor to see if $ + work was reasonable w/re to cost recovery

Experts: exchange names and reports and begin depositions of experts no earlier than March 1

Lindall, Vandenorth, Kung, Leschen, Justin, Hennessy

T.E, P.C. Reilly ; T.J Ryan (Homer)

WAV

Magistrate Bolin will probably call a status call very soon
← may be tough as to future facts to be developed

2nd wk in October is a federal holiday (Columbus day)

(c)

~~Dix~~
Dix ~~Dix Elements~~ ERT Govt

1. Adequate Water Supply - treat, other sources: A

2. Source Control

3. Pathway Control

4. Monitoring

~~5. Monitoring~~

(5. Comm. Relations)

EDA Criteria Document
$10^{-5}$ risk factor

6. Standards
- sum of carcinogenic PAH < 28ppt and
  " of non- " " < 280ppt

- only 2 of the 6 closed wells have more than chlorine as treatment

FM: These standards are reasonable but you'd have to work out sampling protocols
ES: doesn't know if the numbers are right or wrong but at least they're higher
FM+ES+JC: says the numbers are ~ what you find in finished water in the U.S.

Risk factor: 2l/day ≥ has 1/100,000 if injected over 20yrs

(D)

1. Water Treat. Study
2. Cooperative Agreement

EK Let's see ERT's remedial plan:

ES Deal w/ the problems which we have, not potential other problems such as Minneapolis using the g-water

MA Let's look at other options such as g control wells
We are required to get public comment on options

CH2M - Hill Study
- 21 major tasks w/ 3 milestones (50 loops)

- Milestone I
  - literature search or what is available } paper studies
  - technology assessment
  - well sampling w/ complete analysis of 1000 or more chemicals w/ trend analysis based upon past data
  - existing treatment @ W-15 after sand filtration; aeration; chlorination; storage
  - plan for a ~~bea~~ bench scale

August 24, 1982
Reilly Tar

| | | | |
|---|---|---|---|
| Dennis McCayne | Atty | State of MN | 612-296-7702 |
| Stephen Shakman | " | " | " 296-7703 |
| Ed [illegible] | Consultant | " | 202-478-1015 |
| Dale Wiley | Dir Solid & Haz Waste | " | 612-297-2735 |
| Wayne Popham | St Louis Park | | 612 333 4800 |
| John Crown | ERT | | 412-261-2910 |
| Francis McMichael | ERT | | 412-261-2910 |
| Ed Schwartzbauer | Dorsey & Whitney | | 612-340-2825 |
| Robert Polack | Reilly Tar & Chem | | 317 248 6466 |
| Carl F. Lesher | " | | 317 248 6457 |
| David Hird | US Dept of Justice | | 202 633 5466 |
| Bob [illegible] | U.S. EPA (Region V) | | 312-886-6720 |
| Erica Dolgin | U.S. Dept. of Justice, Wash. D.C. | | 202-633-5258 |
| Paul Bitter | U.S. EPA, Chicago | | # 312-886-3007 |
| Michael J Hansel | MN PCA | | 612-297-3770 |

[1]

8/24/82

Notes from meeting with Reilly Tar and Chemical Company Representatives

List of attendees is attached

Introduction by Erica Dolgin, Ed Schwartzbauer

Francis McMichael discussed ERT's perception of the problem as follows:

(1) Trace PAH in Prairie du Chien - Jordan aquifer

a) 15-20 % of water supply closed

b) treat ground water at St. Louis Park Wells

i) Standard of treatment level is needed

ii) ERT will define levels for public use of water

iii) ERT will define numerical limits, sampling protocol and schedule for an operating treatment system. Action taken for violations of treatment levels would be stated

iv) levels for drinking water should be based on a scientific approach to protect public Health

e.g., look at levels of PAH in other cities, esp. along Mississippi River and compare level of treatment (for St. Louis Park) with levels found in other cities

( ~~trying to relate to~~

[2] Problem should be measured after treatment per MCP

NOTE: Attempt to relate Reilly Tar problem to a larger universe that would diminish the "social impact" of coal tar derivatives in SLP ground water.

[3] Ground Water Management is a lesser priority
a) prefer to allow ground water to travel naturally to Mississippi for discharge
b) only treat water when/if used
c) remove pollutants found in all wells (note: levels were not expressed)

[4] Soil Pollution
a) Isolate, contain, remove pollution on a broad scale

Conclusion: define basis of acceptability of PAH in drinking water; prepare and define sampling approach for compliance purposes; provide action for violations. Provide long term approach for identifying sources. Use existing wells for gradient control and/or water treatment

Schwartz Baum = SLP should not be treated different than the rest of State re: PAH levels in drinking water
Propose standard be developed by State
Potable ~~water~~ water supply is measured at tap vs. source
[NOTE: ignores that ground water is the "tap" for numerous private wells now and later]
A] Propose that Reilly finance study for water treatment
i] schedule for implementation is about 1 year from now.

Mc Michaels = priorities for drinking water proposal limited to ~~Reilly Tar~~ SLP only;
put SLP on level of National Exposure to PAH

Klepinger = implications is that SLP should have drinking water supply as bad as the worse case existing

Hansel = ~~quest~~ requests standard proposed by Reilly [NOTE: Now given by Reilly Reps].

Hansel & Wilke = prepare protection [preservation] of aquifers not only treatment of known sources of contamination; must be part of comprehensive solution [future use issue]

Craun = priorities are necessary and water supply is first priority for SLP

Mc Michaels = Source must be controlled or removed to reduce possibility of harming beneficial uses of water
[NOTE: did not define beneficial use or limits which would protect beneficial use, etc.]

a) drift is source - ∴ control

i) monitor concentrations in drift

ii) develop alternatives if changes occur in concentrations [of PAH] in drift

1]

Afternoon

OBJECTIVE: List Common elements discussed between two parties, [Reilly + Govt]

| Element | Reilly | Gov'T |
|---|---|---|
| Adequate $H_2O$ supply Well 17, | A | A |
| Source Control, W-23 W-13 Swamp + drift water | B | B or C |
| Pathway Control, multi aquifer wells, gradient control wells | C | C or B |
| Monitoring Program | A | A |
| Standards Development | A | done |

3) Community Relations Plan [Common to both] —

McMichaels ~~[illegible]~~ ≈ W-23 has always been known to contain a large amount of debris + contamination [This is a change in posture, i.e., the admission of contamination in W-23 over a long period of time]

Craun ≈ Seems like W13 should be pumped for treatment

Hamel ≈ Should be cautious about disturbing the equilibrium within Peat deposits until a [Comprehensive] solution is developed. Could worsen the [transport] situation beneath the site.

Criteria for Potable $H_2O$ ≈ sum of carcinogenic PAH < 28 ng/l and non Carcinogenic PAH < 280 ng/l

Craun ≈ sum of non Carcinogenic PAH may be difficult to attain [for treatment system] [Some may exist as to how the number was developed]
Hamel provides Rational, 3 main Cite arguments lead to number

Wike ≈ must consider protection of Prairie du Chien for future water supply, due to population growth, low flow in the Mississippi

McMichaels ≈ agree with Wike, but must write scenario to predict [or plan] future use and conditions of Prairie du Chien and Mississippi

Schwartzbauer = Can't "write off" Prairie du Chien
[for Convenient/self serving purposes]
A] ERT will focus on alternate water supplies vs. treatment
B] ERT will consider options for Containment of Contaminants in aquifer
C] ∴ gradient Control Concept feasible if alternate supplies are found for drinking water

[6] NIGHT TIME

Crawn ≈ would like to test ground water for TOC, TDS COD parameters.

Hamel ≈ explains scope of work in pending Cooperative Agreement

McMichaels, Schwartzbauer ≈ claim that multi-aquifer well abandonment may not be necessary if treatment of contaminated water occurs. Well abandonment should be a lower priority, possibly part of a comprehensive solution.

Schwartzbauer - ERT will prepare feasibility study for Swamp

Hamel, Bitter ≈ deadlines for submittal should be 8 weeks for Reilly's comprehensive solution and two weeks for participation of Reilly in CH2M-Hill study [ground water treatability]

Schwartzbauer ≈ there seems to be no conflict with the our [ERT] review of the CH2M-Hill contract, perhaps you should continue with it and we could pay you back but we have had trouble before in assuring a quality output ~~on time~~ ...

Bitter - we (governmental agencies) want to assure a quality output and we can do this by placing controls over the implementation of the contract...

Crawn ≈ the contract looks good based on our short review time, there are a number of "do loops"

[7]

Hanel, Crum ≈ explain "do loops" as a logical process that requires analysis of data and outputs before continuation of study.

Beth ≈ what direction will Reilly provide?

Schwartzbauer ≈ propose to participate [technically] on review panel for CH2M-Hill study ...

Can't speak for Reilly Tar [re financial participation] but they generally follow my suggestions

The earliest we can answer this [participation - technical & financial] is next week when Reilly Representatives are available for consultation.

Schwartzbauer ≈ proposes to hire third (unbiased) party to sit on panel, perhaps somebody from Monsanto

Mike ≈ He [third party] would not be unbiased if he is hired by Reilly

Schwartzbauer ≈ agreed

[ Meeting finished with the understanding that Reilly would submit proposals for technical and financial participation within a two week period for the CH2M-Hill study and an eight week period for the Comprehensive Solution comparable to the pending EPA/MRA Cooperative Agreement ]

Reilly Tar

| | | | |
|---|---|---|---|
| Dennis McCayne | Atty | State of MN | 612-296-7706 |
| Stephen Shakman | " | " | " 296-7703 |
| [illegible] | [illegible] | " | 202-[illegible] |
| Dale Wiley | Dir Solid & Haz Waste | " | 612-297-2735 |
| Wayne Popham | St Louis Park | | 612 353 4800 |
| John Crown | ERT | | 412-261-2910 |
| Francis McMichael | ERT | | 412-261-2910 |
| Ed Schwartzbauer | Dorsey & Whitney | | 612-340-2825 |
| Robert Polack | Reilly Tar & Chem | | 317 248 6466 |
| Carl F. Lesher | " | | 317 248 6457 |
| David Hird | US Dept of Justice | | 202 633 5466 |
| [illegible] | U.S. EPA (Region V) | | 312-886-6720 |
| Erica Dolgin | U.S. Dept of Justice, Wash. D.C. | | 202-633-5[illegible] |
| Paul Bitter | U.S. EPA, Chicago | | # 312-886-3007 |
| Michael J Hansel | MN PCA | | 612-297-3770 |

# UNION

1. How many employees were union members
2. What type of employees were represented
3. What unions
4. Who were union representatives; who was chief representative
5. How long was there unionization
6. Was there a union contract
   - who negotiated the contract for Kelly; for the union.
   - were there any union grievances w/r to safety or housekeeping
   - did the union contract have any provision that dealt w/ drinking water for the workers at the plant
   - did you have to periodically test the well water; which wells
   - did the contract specify that the employees would drink the water from the shallow well; why

✓ 1. Common Ditch
- what did you consider to be the common ditch
- other than straw filters was anything ever done to the ditch by Reilly Tar: excavation, expansion, dredging, maintenance, inspection
- who would do this if it were done
- when was the Lake Street culvert filled in
- by whom; why
- how did this effect the Reilly Tar site
- how did this effect the area between Lake & Walker Streets

✓ 2. Refuse + Waste Disposal
- where was the waste disposal prior to his becoming plant manager (in open area in N side of site)
- was anything ever ~~disposed of off site~~ taken off site for disposal
- what happened to the waste when he was plant manager
- where did it go; who did it; what was it

✓ 3. W.A. Justin
- when was he the refinery (~~or was it treatment plant~~) superintendent
- what were his duties
- he did research on treatment methods for the waste water + recommended the Edens separator
- was he the person most knowledgeable about treatment technology at the site? in the company? if not, who was?

✓ 4. Deep Well
- did Renner fill it up to the water bearing strata (250'); when
- why; who said to do it; how did they do it; what did they put in the well
- how long did the people at Reilly think that the well was 250' deep below water bearing strata

6. The Mud in the cooling pond
- what did it cost to use the city water
- was this more than what it had cost to use the well;
  - if not, why didn't they switch earlier
  - if so; how much more
  - why did they stop using the well
    (was it sand in the well or mud in the pond)
  - where was pump intake; what was role of intake
  - how deep was the pond
  - did they stop using the well because of sand clogging the pump or tar/petroleum clogging ~~the~~ the pump, or mud in the cooling pond
  - who ordered the change from well water to city water; why?
  - how often was the air lift pump lubricated
  - why would lubricating oil freeze up something like a water pump

8. Union
~~- what was the union at the~~
- were all the workers union members
- which ones; what union
- who was the chief union representative
- who ~~was~~ were the union stewards
- was there a union contract
- did it specify the use of the shallower well; why
- did it require you to periodically test the drinking water? why?
- any union grievances a/re to housekeeping or job safety

✓ 9. Repair and Maintenance
- who was responsible for inspection; maintenance; repair; of pipes, tanks, trains
- what were the specific responsibilities
- what hours spent for each responsibility/week
- how many men assigned to each task
- how were trains cleaned; what was done to clean them

(from Lockard)

- why were riveted tanks replaced w/ welded tanks; were they cheaper; were they less prone to leak; how many were replaced

8. Weed Control
- w/ what; how often; where; how much stuff

9. Railroad
~~did there use to be other rail lines at the site~~
- what were the RR lines; where; for what
- were there other lines before; why
- any tip over?

10. Tank 20
- insulation had to be replaced because of vapors; what kind of vapors

11. Steam lines
- discharged into trench so as not to foul up the boiler
- ~~[illegible]~~ - why would it have fouled up the boiler

12. Union

Reilly Tar Meeting: D.C. October 29

① W-23:
ERT owes the state $16,000 but RT will only pay back $8000
- the work is substantially complete → w/in math
- sugar beet after cooperative agreement → ok
- Hickok is done w/ well survey → final report w/in 2 mos

② CH2M-Hill
- treatment system → 60-80% removal of PAH at site
- Hickok used powdered activated carbon ~ 2 yrs ago @ the site ~ 90%
- results of bench testing (conventional) w/in 3 wks
- other results ~ 3 mos: UV, carbon

Bitter: writing fact sheet w/in 2 wks
ERT milestone meeting
- Monsanto went below 1 ppt → he has data + will get QA, QC
- ERT said we're mad

1. PAH limits
- give data to toxicologists (done in 3 mos) water treatability, some kimble data,
- Rita LaVella

2. Next Thursday meeting w/ Kimble w/re to scope of work

3. soils GCA: $90,000 for 18 wells
- last wk drilled 2 holes offsite to bedrock (85')
- Brown is a sub of GCA
- N of Rte #7 is loaded w/ packets of coal tar + peat bog area → 10 wks (by 1/1/83) w/ analysis w/in 45 days of receipt of sample
- 2 N of Rte #7 2 offsite (NW)
a few closer in NW of site 2 S of #7
purpose ① to see extent of coal tar in drift ②
② to analyse peat moss

4. Thompson
Pfennicarch ⇒ ~~REM/FIT~~ RIMFT will pay

5. Marc Hult : Ramsey letter to Albin

6. Upper aquifers:

Water treatment of PAuChien $1-3 million
15 acres of slurry wall w/ well system $15 million

2:30 8:30

7. Autogenicity:
W-23 → ~~Epplen~~ Epler @ Oak Ridge
will test to in W-23
" W-15 for water

8. Jury Trial

# REILLY TAR

1. Status of Superfund Effort
   - coop agreement done by ___ 12/83
   - implementation of remedy by ___
   - CH2M-Hill water treatability study 7/83
   - ERT input
   - costs incurred to date
   - ✓ status of Weston
   - EIS / EA

2. Other technical
   - GCA soil borings: where, how many, when, why
   - OK ✓ w-300: is it needed? why?
   - Capsule Labs: analysis of water samples
     - how many, why, when
   - ✓ USGS: what is Hult doing? for whom?
     - modeling? other studies? → status
   - ✓ MPCA: what are they doing
   - EMSL/LV: what is Foerst doing? when will he be done? will we get a written report? oral?
     - how does EMSL jibe w/ Kimble? conflicts?
   - Kimble: what is he doing? why
   - Selkirk, Bingham: " "
   - Garrity + Miller: when do we give them stuff to review, what will they say? who will testify?
   - Olaf Pfannkuch:
   - Warren Thompson: what would be his role at trial

3. Legal:
   - Ward Barton, Horner, P.C. Reilly Jr., T.E. Reilly Jr. Wheeler.

   - Hird's efforts: what's he up to w/ chain of custody, etc.
   - depositions: when?
   - technical ready when?
   - when go to trial?
   - bifurcate?
   - meeting w/ magistrate

1. locate + interview Paul White, SCP ref. super. to 1969
- and Ward Barton, wood pres. superintendent
① ✓ - Dr. Wheeler (retired)
✓ 2. Barton: took care of settling basin, straw filter, wier
3. R. Tar may have used Twin City Testing
✓ 4. Renner (Jr + Sr.)
5. Boyle (RJ) ~~Ryan~~ Ryan T.J.
6. Check w/ union
? 7. Dr. Mootz was prod. mgr. + now lives in S. Bend
8. GM of ref. div reported to T.E. Jr. (1968-1977)
① ✓ 9. H. R. Homer lives in Indianapolis (retired)
① ✓ 10. Boyle: ins matters + mgt. 1945-1972
11. Hennessey + Homer know a lot about the other plants
? 12. CB Edwards: director of research, vice-president
(nursing home outside of Indlps)
② ✓ 13. Ryan: gm of ref, pres, exec. v.p. 63-81

① → Wheeler, ~~Boyle~~ Boyer, Homer
② → P.C. +/or T.E., T.J. Ryan → stroke

(1) Why do we want to release these data to Reilly?

(2) What's going on?
- do we have an agreement w/ them
- what are they doing
- what do the other atty think

(3) If we give this to Reilly Tom, then
#1 looks OK
#2 is a draft + shouldn't be sent out + also makes a comment we disagree with and
#3 NDH analyses shouldn't be sent to Reilly w/o discussing, esp. since we are looking at them now ourselves

~~REILLY~~

# Documents Produced by EPA 2/20/85

correspondence w/ Koz

Carcinogen Assessment Group's Prelim Report on POM Exposure

Prelim Assessment of Sources, control + Population Exposure to POM

Sources + Emissions of POM

Risk Assessment & Mgt Framework for Decision Making

documents out to COPY GENERAL 544-8660

Gruber report - Toxics Integration Task Force - Risk Mgt Subcommittee

Gruber speech - Developing a more consistent risk mgt policy @ EPA

Health Assessment Doc for POM

BaP Health and Environmental Effects

Research and Development - Health Effects for BaP

Memo from Thomas to Kay - ACL Demonstration

6th and Md

★ Memo from Myers to Addresses re Draft ACL

☆ Memo from Hedman to Ris re Toxicity Data

→ they'll copy docs., send originals back to me.

☆ Memo from Mittelman to Kosakowski re Reilly Tar

An Exposure and Risk Assessment for BaP Vol I - III

Results of Analysis of water samples, sludge sample + soil samples

GCA boring logs

☆ GCA Rennekamp ltr to Kosakowski

Analysis

☆ GCA Wilder letter to Hansel

☆ GCA Wilder letter to Hult

Hickok Memorandum re SLP GW Contamination study

Goerlitz + Hult publication

☆ Reilly Tar Proposed Super Fund Site Project

MRI Conrad letter to Toepfer

Federal Assistance Application 7/27/82

Remedial response fact sheet - Reilly Tar

Community relations plan

WKC

Memo from Adamkus to Gary Dietrich re Decision Memo
Memo from Hedemen to Gavelle re Corp. Agmt
Budget summary
☆ GCA McGregor letter to Koszkowski 10/1/82
☆ GCA Rennekamp letter to Koszkowski 6/8/82
☆ GCA Engelman letter to Koszkowski 8/10/82
☆ Analysis of Environmental Samples in Support of EPA II
CH2M Hill folder
GCA folder
CH2M Hill Voucher packet

MBK

~~RBA Assessment~~

- Proposed Guidelines for Carcinogen Risk Assessment, November 2, 1984 (Risk Assessment)

- EPA WO Analysis, 6-10-81.
- ~~8-10/13/81~~
- 8/10-13/81 WO Sampling results.
- Table 21
- Field Investigations of Uncontrolled Hazardous Waste (Cost estimate for Clean up of Contaminated Groundwater & soil at Reilly Tar & Chemical Co facility).

- June 1983, GCA Corp. Analysis of Environmental Samples for Region V: Soil Core Samples from the Reilly Tar Site

- Soil Contamination by Creosote Wastes: A quantitative Physical/Chemical Analysis of the Northern Portion 1800078-1800207

- Final Report: Misiellaneous copies of data files. 5158 etc.

- letter June 23, 1983 Denis Foerst to Michael Harris

WKC

- FIT: Emergency Pumpout Well for Reilly Site.

- FIT: Cost Estimate for Clean-Up of Contaminated Groundwater & Soil at Reilly Site. (draft ?)

☆ - Letter from GCA (Kenneth T. McGregor) to Mike Kosakowsk re: Analysis of Soil Cores for PAH: dated March 2, 1983. (with enclosures).

- Analytical Results: Samples from SLP, MN. May 31, 1977 by Emilio Sturino.

☆ - Monthly Task Report (TR-1), GCA Corp. Soil Sampling - Testing at Reilly Site. 5/31/83

☆ - Feb 24, 1983 Memo: Justification for extension of time for GCA work. Kosakowski to Julie Klaas

☆ - Monthly Task Reports GCA Corp. 12/31/82; 10/31/82; 9/30/82

MHK

- Work Plan Summary : GCA project;
  Soil Sampling at Reily Site
  Submitted 9/30/82

- Letter 30 Sept. 1982 ; ~~Award of Subcontract~~
  to Brann (GCA K).

- Cooperative Agreement ; Letter from Sandra Gardebring
  to Valdas Adamkus dated 2-16-84.

- Letter report McGregor (GCA) to Kosakowski
  dated 4-20-82. ; also 6-15-82 ;
  also 9-24-82 ; 4-20-82

- QA/QC GCA Project Plan 10-15-82

- Community Relations Final Review.
  Dated July 18, 1983

WKK

Reilly Document Request - Oct 15, 1984

1. Waitt
2. Waitt

3/4) The United States objects to this interrogatory as overly broad and irrelevant to the Reilly Tar site. Without waiving this objection, principal documents on risk assessment and risk management of polynuclear aromatic hydrocarbons are listed below:

i) ~~EPA~~ Water Quality Criterion Document for Polynuclear Aromatic Hydrocarbons (Water) ~~(Federal Register~~ (45 FR 231, ~~Friday~~ November 28, 1980)

ii) An Exposure and Risk Assessment for Benzo (a) pyrene and other Polycyclic Aromatic Hydrocarbons (Volumes I-IV), Office of Water Regulations and Standards, 1982

iii) Memorandum ~~from~~ Toxicity Data for Polynuclear Aromatic Hydrocarbons: Reilly Tar Site in St. Louis Park, MN, from Charles Rice, Acting Executive Director Carcinogen Assessment Group to William N. Hedeman, Jr., Director, Office of Emergency and Remedial Response

Double Check

~~iv) Health and Environmental Effects Profile - Polynuclear Aromatic Hydrocarbons, Office of Solid Waste~~

iv) Health and Environmental Effects Profile - Benzo (a) Pyrene Office of Solid Waste (Judy Bellin)

5. See response to no. 1

6. The Studies and Methods Branch of the Characterization and Assessment Division of EPA's Office of Solid Waste does not determine alternate contaminant levels (ACL). The Land Disposal Branch of the EPA Office of Solid Waste is preparing draft guidance on ACLs. This guidance in present draft form is general and not contaminant specific. The Land Disposal Branch reviews ACLs granted by the EPA Regional Offices

for hazardous waste facilities. ~~On~~ 11/19/89, EPA's ~~Office~~ Office reviewed a draft ACC for a facility in Region 7, which included an ACC for PAH. The review is described in a memorandum dated 11/19/89 from Lee Thomas to Region 7, ~~commenting on the risk levels~~

~~Is $12-14 M the right figure for Chem-Dyne?~~

9/84 ECAO Env. Crit and Assess Office - ORD

50 reports

<Prep. for OERR Health Effects Assessment Docs.>

Draft Benz (o) Pyrene

USES $10^{-5}$

Craig Zamuda / OERR
475-8718

Reva Rubenstein X4806 room S-248 w/ sec'y

---

Chem Plex | Clinton IA
Proposed for inclusion in NPL

PAH site Don Sandifer

---

Craig Zamuda

HEA's : use for design goals

q, * dose response no. / carcinogens

Authors prior direction to use risk level
In the future, risk levels removed.

Draft docs, not for regulatory purposes

based on WQC

"HEA's" almost identical to "HEEPs"

Dave Crawford 758 - 6864 ChemPlex

3 recovery trenches
Pump / Treat → NPDES treatment facility
bedrock gw → pump out well

No criteria discussed

Plastics facility Napthalene Styrene / predominant Benzene
Some anthracene, pyrene

lagoon failure

David Hird
633-4592

mark,

IMPORTANT

i made arrangements with d. hird for you to go to washington on wednesday feb. 20th to review documents you should contact (on tues, mon is a fed. holiday) john fleuchaus
epa enforcement attn
202-382-3109
to make arrangements. if he is not available contact katt sellers
environ scientist or engineer
(grundlers team)
202-475-8259

hird would prefer you to deal with fleuchaus since he is a lawyer

EPA address is 401 M Street S.W
EPA offices

9.11.84

Reilly Tar  Conference Pursuant to Unilateral A.O.

Ed Schwartzbauer (counsel to Reilly)

- Legally impossible to comply (can't operate DW system in State of MN - not a municipality) w/out SLP's consent.

- Only ordered by U.S.; not other plaintiffs.

EPA (John Cramer)
Two Primary Concerns
1. — Criteria for PAH
2. — Design / implementation of system as ordered

1) Disinfected and concerned criteria "dropped" from 28 ppt to 2.8 ppt
- Many finished water supplies exceed these criteria
- Enlarges problem at site, longer to solve, harder to solve

2) GAC treatment
- Doubts that can be achieved
- Quinolin breakthrough
- Reduces carbon life

3) No rational health basis for 280 total PAH criterion

4) GAC Design
- Specifying design rather than performance; should specify performance stds. (28, 280 ppt)
- other designs are as reliable and more cost effective
- Flow rate too high - 1200 should be peak
- System should be downstream of sand filters
- System should be inside a building

(2)

- Design should be package system from Calgon - 2 columns in parallel
  10' diameter
  9' Carbon beds
  14' overall height

- Design theory indicates both systems give same performance
  Cost of Calgon is 1/2

- System could be up in 2 months

- Annual costs equivalent

- Recognize design philosophy diff. btw parallel/series operation

- Breakthrough times are long and can be predicted

- Change carbon can be done easy (say 100 ppt Total Halo)

- Calgon will guarantee design performance

- Order, therefore, should specify performance

CALGON

- Reviewed data, last year and chose design

- Have installed over 50 systems for g.w. treatment

- Chose 2 beds operated in parallel

- Design is economic decision based on perf. stds picked by client

Bilter → Have you installed beds in series?
- Most of our beds are installed in series

Bilter → want series because of unknowns such as heavy weight carcinogenic loading. Seeing right now rapid movement of lt. weight carcinogenic compounds

3)

PB 2.8 is target if technologically feasible (ROD)

Quinoline is weak carcinogen and need not be regulated under 2.8

Health basis for 280 is ratio to carcinogenic PAH
280 is more of an indicator; could change in the future based on what we see in P&C.

CARBON

- 2 10' diam. 20000 lbs carbon beds in series

- Design has been used at CERCLA sites:
Wausau, Battle Creek

PB → Temporary Systems

- Hydraulic loading comparable to $CrO_2$ Mill

- Downstream from sand filters so iron content removed before columns

- System located in bldg.

- No transfer tank

- Equipment is in stock; installation time 6-10 wks

- Need more pilot work prior to start to predict breakthrough

- Attainment of quality goals → pot. prob. w/ quinoline
No problem mtg 280 or 28 goals
If quinoline out, no problem meeting 2.8

- Est. carbon usage of 13,500 lbs/yr using isotherms ~~study~~ capacity for exhaustion zone

- Peak rate 1200 gpm annual rate of 578 gpm

4)

→ 12 gpm / ft² → for treated water

- Backwash tank and holding tank / Backwashing w/ clean water. Mike H.: why not use SCP 11?
- Design system for 1200 peak (Capital Cost)
  Used 300 mg/yr for O&M costing (based on historical use of SCP 15/10)

Operation & Maintenance

- Calgon provides service to operate / maintain / dispose or recharge of carbon
- Much experience w/ these systems
- Larger diam of tank, greater difficulty in removal of carbon
- Takes 2-3 days to respond to breakthrough

Costs

O&M comparable

Capital: big difference is piping valves needed for series operation

larger diameter requires larger bldg; larger tanks more $

LUNCH

Bob L. / David H.: What is your proposal? Do you accept performance criteria?

Schwartzbauer: That's what we are here to talk about

DH: Need to move forward quickly. Fund is ready

TB: Need to know your commitment.

TS: Concept is to build Calgon system to meet perf. criteria
Subject to legal framework to be worked out by
all 3 Plaintiffs

5.)

Reilly now questioning 2.8 ppt as technically infeasibility

Concerned about precedent.

→ Need written response by 9/14 indicating commitment

~ ADJOURN AD CONFERENCE ~

S. River: add'l areas of concern in RAP

Surface remedy (Soil, Run-off)
Swamp

DH proposes for 1 wk extension - will ask Judge Magnuson

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Chris —

a "Reader's Digest" version of the meeting w/ Reilly in Chicago.

Kate

REILLY TAR MEETING 12/6/84

PURPOSE: TO DISCUSS (AND TRY TO RECONCILE) THE TWO RAPS.

ERT/REILLY HAD 6 CONCERNS:

① DRIFT-PLATTVILLE GRADIENT CONTROL
- asked that the 1 ug/l PAH criterion be reconsidered; either reset the criterion higher (5-10 ug/l) or define the well placement by the geology/geography of the area to be pumped (not by concn.)

② ST. PETER CONTAMINATION
- old data has turned up from Summer '80 (MDH data from Hickcek's files) showing four wells to be contaminated ~~at~~ at or above the drinking $H_2O$ criterion.
- questioned value of data since it's HPLC, not GC/MS; Accurex will check data.
- suggested several options
  - set up a 5 year monitoring period instead of initiating the gradient controls set out in the RAP
  - redefine the trigger ~~[illegible]~~ ~~or~~

③ PRAIRIE DU CHIEN MONITORING WELLS
- QUESTIONING PLACEMENT OF WELLS, usefullness of resulting data (vs cost.)

④ NPDES LIMITS ON DISCHARGE TO MINNEHAHA CREEK AND LAKE CALHOUN
- asked that limits could be written specifically into the RAP (in the context of a draft permit)

⑤ MULTIAQUIFER WELL FIXES
- asked to define cutoff by a mass transfer rate (eg 4 oz/year, based on contamination of 500gpm well) rather than a concentration (DW criteria)

⑥ STOPPING POINTS - GAC and WELL 23
- proposed an alternative to the "5 consecutive years" required in the RAP:
5 consecutive analyses (weekly or monthly) within 90-95% confidence limits of stds. would allow for the GAC tmt. to shut down; this would be followed by long term monitoring (and future treatment if necessary)

GOVERNMENTS' REPLIES TO REILLY/ERT CONCERNS:

① DRIFT- PLATTVILLE GRADIENT CONTROL
- will consider changing the criterion after completing the RI/FS

② ST PETER CONTAMINATION
- no change in position

③ PRARIE DU CHIEN MONITORING WELLS
- no change in position; ~~still~~

④ NPDES limits
- MPCA beginning to work on NPDES limits; hopes to have literature search done by the end of the month
- "draft" limits can be included in the RAP

⑤ MULTIAQUIFER WELL FIXES
- will consider Reilly/ERT proposal; cooperative agreement allows use of mass flow rates (flow rate still to be set)

⑥ STOPPING POINTS
- will consider Reilly/ERT proposal for GAC system, not for gradient control wells.

REILLY/ERT ALSO SAID THAT THEY'LL . . .

- submit a new RAP, rewritten on the basis of this discussion, within about a month
- sort through and reduce all available data and prepare a pseudo-RI for the government within about 5 weeks (for use in RI/FS); ERT has recently found a lot of old USGS data that they think will reduce or eliminate the need for further testing

The analysis of the coal tar distillation / wood preserving site in St. Louis Park, Minnesota performed by Barr Engineering Co. has shown that contamination has occurred to the glacial drift ground water systems and ~~that the waste in the drift is a potential that~~ also and has slightly contaminated the underlying bedrock ground water aquifers. As part of the remedial actions a major recommendation of the report is that the identified coal-tar wastes in the glacial drift and Platteville aquifer be controlled by gradient control wells. Under this technique, a system of pumpout wells are placed in the aquifer to intercept the wastes. Water from the gradient control wells can be discharged to the sanitary sewer system, treated and discharged to Minnehaha Creek, or a combination of these two disposal locations can be used.

Besides contamination to the upper aquifers, the deeper aquifers in the Mt. Simon - Hinckley FORMATION have been slightly contaminated by the waste. The community of St. Louis Park and various industries have ~~had~~ abandon wells in the area. Realizing the purpose of this evaluation is to develop an order-of-magnitude cost estimate for the remedial activities at the site a number of assumptions must be made to complete the estimate. The first major assumption is that the deeper aquifers identified above must also have remedial actions. The following section develops the information necessary

to complete the order-of-magnitude cost estimate for treatment and disposal of the contaminated ground water ~~below the site~~.

## Wastewater Quantities and Characteristics

Characteristics of the waste water from the glacial drift gradient control wells have been preliminarily developed ~~by~~ in the Bova Engineering report. In lieu of the study presently being performed by the USGS these values are the best available. Table #1, column A, attached summarizes the wastewater quantities and characteristics for the glacial drift control wells. The report projected the ground water quality from data collected during the study and over the previous few years. A range for the characteristics is presented in the Bova report however for purposes of this report the maximum value will be used because a treatment ~~plant~~ system must be designed for the maximum loading. In accordance with this philosophy of being conservative the projected flow of 45 gpm was increased to 100 gpm.

P11 Also on table 1 in column B the characteristics of the Platteville (100 gpm), St. Peter (100 gpm), and Prairie du Chien-Jordan (225 gpm) are projected using values from the same report. The values are the low end of the range presented for the down gradient control wells from the glacial drift and are being applied to these aquifers ~~in order to be~~ THE BEING conservative. The flows (which are in ~~the~~ brackets) were developed

from experience and using good engineering judgement. ~~Ctd~~ Column D on the same table combines the two (shallow aquifer) projected waste streams. These two streams have been combined because they are the most contaminated streams ~~which~~ and will ~~have a~~ probably have a high degree of variability. ~~This disposal will be address later in this report~~. The Polynuclear Aromatic Hydrocarbons that have been tentatively identified are as follows:

| | |
|---|---|
| naphthalene* | acenaphthene |
| pyrene* | dibenzofuran |
| anthracene ~~or~~ phenanthrene*1 | fluorine |
| fluoranthrene* | benzophenanthene |
| methyl naphthalenes | benzofluoranthene |

This streams disposal will be discussed later in this report.

The characteristics of the ~~deep~~ Mt. Simon-Hinckley aquifer are projected ~~on~~ in column C on ~~the same~~ table 1. Lacking other data ~~on~~ (The following) assumation was made: The deep aquifers ~~g~~ are contaminated with the same waste as the glacial aquifer therefore the pollution characteristics will be similiar (to the glacial drift) just diluted by a factor. The dilution factor was applied ~~developed~~ using the ~~following~~ methodology that if the concentration of similiar pollutants are know for both aquifers then the ratio between the two can be applied to ~~the other variables~~ unknown parameters. ~~Thus~~ Even tho this is not theoritically accurate, it will procedure an (approximate) order of magnitude value. After the 100 minute

pumping test conducted on the on-site Mt Simon-Hinckley well there was a phenolic concentration of 0.005 mg/l. Taking the ratio between this value and the 3 mg/l projected ~~by B~~ for the glacial drift yields a dilution factor of 0.00167. Applying this factor to the remaining ~~values~~ parameters in column A on table 1 yielded the remaining values in column C. for the Mt. Simon-Hinckley aquifers. It must be stated that before any remedial actions are actually suggested for this aquifer it must be characterized by an extensive sampling program. However, in order to develop a cost estimate the values on table 1 which are felt to be conservative will be assumed representative for the source. To control the pollution in this ~~well~~ aquifer by gradient control wells, the maximum drawing force of 1500 gpm from the municipal wells must be equalized by a cone of depression created by the new wells. Therefore a pumpstrate of 1500 gpm is assumed to be the flow necessary for ~~that~~ the deepest gradient control wells.

DISCHARGE of gradient control wells.

The disposal of the ground water can be ~~handled~~ by two routes - discharge to the sanitary sewer or discharge to the MINNEHAHA creek after appropriate treatment if necessary. Alternatives can be devised that will combine these two routes.

Since the discharge of the 1500 gpm from the MT. SIMON - HINCKLEY aquifer is ~~the easiest~~ easier, the report will address ~~the~~ its disposal first. Table 2 presents the standards for discharge of storm water from the site to the Minnehaha Creek (these values were abstracted from the BARR Engineering Report). Comparison of these values to those projected in column C on table 1 shows that the waste can be discharged directly to the creek.

The discharge of 525 gpm (0.756 MGD) from the gradient wells is not ~~as easy~~ quite as easy. Due to regulatory constraints the water quality parameters of most interest in the discharge from the ground water gradient control wells include phenolic substances, polynuclear aromatic hydrocarbons, chemical oxygen demand, and oil and grease. Even tho a majority of the identified organic pollutants are reported to be biodegradable it is not recommended that the waste be discharged directly to the sanitary sewer system because of the possibility of upsets to the municipal system if a concentrated slug of

(and has a toxic effect on the microorganisms)

undiluted waste reaches the plant. Therefore pretreatment is necessary before discharge to the sewer.

To date the development and sizing of the treatment alternatives for the waste streams has been based upon theory, and a few preliminary tests using samples obtained from a ~~few~~ couple of wells. Initially the ~~pumps and~~ gradient control wells are expected to have a highly variable wastewater pollutant loading where the potential for upsets, equipment failures, and other unusual non-equilibrium conditions are great. Therefore, any waste treatment system must ~~be able~~ provide maximum flexibility and adaptability to handle wide fluctuating conditions. ~~Therefore~~, this would eliminate biological treatment which is prone to upsets during non-equilibrium conditions. ~~and direct~~ The most attractive approach to insure reliability and compliance of treatment facilities would be a physical/chemical treatment approach with discharge to the sanitary sewer system which reportedly (with minimal pretreatment) can handle an additional flow of 0.756 MGD. After continual operation it is feasible ~~possible~~ that after treatment the waste could be discharged ~~to~~ directly to the river.

HYPOTHETICAL

Potential Facilities for Treatment of the Waste Stream

A brief description of a treatment facility which theoretically should be able to handle the projected waste stream from the shallow aquifers is as follow:

The initial unit process would be a equilization tank of 0.756 MG ~~to be~~ necessary to homogenize the waste, handle surges, and act as a buffer for equipment failure further down the treatment train. ~~Next~~ Oil facilities to break the emulsified organics and remove the oil and grease from the wastewater. This can be preformed by chemical oxidants and coagulants followed by either gravity separation or filtration. Chemical selection must realize that it is preferable to avoid or minimize oxidants which contain chlorine because of the possible production of chlorinated hydrocarbons. For purposes of this study it will be assumed that the chemical addition will be at one-half the oil ~~and~~ and grease concentration (producing a sludge solids concentration of 1540 mg/l) and filtration will be ~~required~~ proposed at a rate of ~~4~~ lbs/sq ft/hr. The discharge from the filtration unit will ~~go~~ be pumped to Activated Carbon columns which will absorb 0.05 lbs of phenol substances per lb of carbon (along with certain polynuclear aromatic hydrocarbons ~~[illegible]~~). The sludge produce by the facility will be transported to an approved ~~disposal~~ landfill and the effluent wastewater should ideally be discharged to the city sewer.

The above treatment facility is based on the PRELIMINARY bench scale tests as reported by Bovee Engineering, the treatability characteristics of coal tar waste, and

good engineering judgement. Further information and testing is required before any decisions are ~~are~~ finalized. The tests to date have only touched the surface and this ~~[illegible]~~ treatment train was developed only for an order-of-magnitude cost estimate ~~only~~.

Facilities for the gradient control wells from the deep aquifers only requires an equalization basin to handle any unusual circumstances that might require the diversion of the waste to the city sewer systems and an effluent monitoring station.

CONCEPTUAL COST ESTIMATES

PREFORMED BY E/E PERSONNEL

The capital cost was developed on a process-by-process basis using vendor estimates, Means Building Construction Cost Data, unit cost values from prior ~~completed~~ projects, and the like. The costs came from different sources, but all costs were escalated to ~~1st~~ 2nd quarter 198~~8~~ dollars using the Engineering News-Record Construction Cost Index of ~~2900~~ 3000. The capital costs of the individual processes were added for a total installed cost. Auxiliary costs (piping, electrical, instrumentation, and site preparation) are based on prior ~~Weston~~ design experience and are calculated as a percentage of the installed costs. Engineering and contingencies are calculated as a percentage of the total construction cost and added to give the total capital cost.

Using the procedures described above, the total capital costs should be understood as accurate to +50% to -40%. This estimate does not allow for unusual site preparation, ~~additional power facilities, disposition of existing ponds or their contents, or a final outfall pipe and structure~~. OR OTHER UNUSUAL CIRCUMSTANCES INCLUDING LEGALITIES.

The conceptual capital and O/M costs estimates are presented on Tables 3 and 4. The total estimate conceptual capital cost is approximately 5,000,000 and the estimated operation and maintenance cost is _____.

Table

COAL TAR DISTILLATION / WOOD PRESERVING SITE
ST. LOUIS, MINNESOTA

Summary of Conceptual Operation & Maintenance Cost Estimate for Treatment of Creosote Contaminated Wells Wastewater

| ITEM | YEARLY COST | 35 YEAR COST IN 1981 DOLLARS |
|---|---|---|
| Power | 80,000 | 2,800,000 |
| Labor | 320,000 | 11,200,000 |
| Material | 100,000 | 3,500,000 |
| Chemicals | 400,000 | 14,000,000 |
| User Charge & Industrial Cost Recovery (1) | 1,200,000 | 12,000,000 |
| SLUDGE DISPOSAL | 20,000 | 700,000 |
| Taxes & Insurance | 50,000 | 1,750,000 |
| | | ~~45,950,000~~ |

TOTAL 35 year O/M 45,950,000
SA-146,000,000 capital

(1) The effluent will only be discharged for 10 years to the City treatment plant, the remaining years it will be discharged directly to the MINNEHAHA Creek

Table 1

COAL TAR DISTILLATION & WOOD PRESERVING SITE
ST. LOUIS PARK, MINNESOTA

## ESTIMATED ANTICIPATED ~~PEAK~~ PARAMETERS FROM THE GRADIENT CONTROL WELLS

| | A GLACIAL DRIFT AQUIFER | B PLATEVILLE ST. PETER PRAIRIE du CHIEN JORDAN | C DEEPER AQUIFERS | D A & B COMBINED |
|---|---|---|---|---|
| Phenolic Substances mg/l | 3 | 0.2 | 0.005 (2) | 0.733 |
| lbs/day | 3.60 | 1.02 | | |
| Chemical Oxygen Demand, mg/l | 1800 | 40 | 3 | 375 |
| lbs/day | 2161.73 | 204.16 | | |
| Oil and Grease, mg/l | 1700 | 6 | 3 | 329 |
| lbs/day | 2041.63 | 30.62 | | |
| Polynuclear Aromatic Hydrocarbons, mg/l | 100 | 10 | 0.170 | 27.14 |
| lbs/day | 120.40 | 51.04 | | |
| Biochemical Oxygen Demand, mg/l | 300 | 30 | 0.5 | 81.43 |
| lbs/day | 360.29 | 153.12 | | |
| Flow, gpm | 100 | 425 | 1500 | 525 |
| MGD | 0.144 | 0.612 | | 0.756 |

(1) THE HIGHEST VALUE ON TABLE 8 IN "Soil and Ground Water Investigation" June, 1977, Prepared by the State of Minnesota, and authored by Barr Engineering Co.

(2) From page III-34 of report referenced in footnote #1, concentration after 60 minutes of pumping from MT. SIMON-HINCKLEY well on site.

(3) Report referenced in footnote #1 estimated 45 gpm, 135 gpm is an assumed safety factor

TABLE ~~10~~ 2

STANDARDS FOR DISCHARGES OF STORM WATER FROM SITE TO MINNEHAHA CREEK[a]

| Substance or Characteristic | Permissible Concentration With Dilution | Permissible Daily Maximum Concentration |
|---|---|---|
| Oil and Grease, mg/l | 0.5x[b] | 15 |
| Phenols, mg/l | 0.01x | 0.1 |
| 5-Day Biochemical Oxygen Demand, mg/l | 5x | 45 |
| Total Suspended Solids, mg/l | 5x | 45 |
| Total Chlorine Residual, mg/l | 0.01x | 0.2 |
| Zinc, mg/l | 0.12x | 1.0 |
| Cadmium, mg/l | 0.03x | 0.2 |
| Copper, mg/l | 0.01x | 0.5 |
| Nickel, mg/l | 0.52x | 2.0 |
| Lead, mg/l | 0.03x | 1.0 |
| Ammonia, mg/l as N | 1.0x | 2.0 |
| Benzo-α-pyrene, mg/l | -- | 0.00001 |
| Chrysene, mg/l | -- | 0.00001 |
| pH, units | -- | 6.5-8.5 |

[a]Source: NPDES Permit No. MN 0045489. Refer to permit for additional detail.

[b] $$x = \frac{(0.25)(\text{flow in Minnehaha Creek})+(\text{effluent flow rate})}{(\text{effluent flow rate})}$$

Flows used in calculation of dilution ratio "x" shall be the daily total effluent flow rate and the daily total flow rate for Minnehaha Creek.

# A P P E N D I X  F

## TREATABILITY OF COAL-TAR DERIVATIVES IN EFFLUENT FROM GRADIENT CONTROL WELLS

## APPENDIX F

## TREATABILITY OF COAL-TAR DERIVATIVES IN EFFLUENT FROM GRADIENT CONTROL WELLS

Due to regulatory constraints, the water quality parameters of most interest in the discharge from the ground water gradient control wells include phenolic substances, polynuclear aromatic hydrocarbons, chemical oxygen demand, and oil and grease. Concentrations of these organic parameters can be reduced by a variety of physical, chemical and biochemical processes which are described in the literature. In this appendix, some of these processes are briefly described. The results of laboratory tests undertaken to investigate the feasibility of several simple treatment operations are also presented.

### Physical Treatment

Gravity separation, the simplest form of physically removing oily material from water, is comparable to primary treatment of wastewater in conventional sewage treatment plants. This approach is often successful, especially where oily wastes are highly concentrated, and can result in removal of a variety of organic and oxygen-demanding substances and in recovering economically useful materials. However, it has been observed that hydrocarbon mixtures in effluent from the gradient control wells will not separate readily, either because of a highly emulsified condition or because of interaction with soluble organic material, such as phenols. Upon standing for periods in excess of 24 hours, a degree of separation did occur among samples from Well 13, with a heavier dark brown sludge settling below a tan to brown supernatant. However, the sludge fraction still contained a significant amount of water. Therefore, it is likely that gravity separation processes are not feasible for efficient removal of organic materials from the effluent. Thus, if physical treatment is to be useful, more sophisticated technology must be introduced. Flotation, filtration and coagulation processes have been successful in separating oil/water emulsions (Patterson, 1975; Reynolds and Shack, 1976).

Preliminary tests, which will be described in more detail in the discussion of chemical treatment, indicated that partial chemical oxidation and coagulation successfully broke the emulsions to produce a heavy sludge, leaving a reasonably clear supernatant. Other methods of physical treatment--such as volatilization, flotation, filtration and centrifugation--were not examined.

## Chemical Treatment

A variety of chemical oxidants and coagulants are available that will participate in chemical reactions to remove oily or emulsified organics from wastewater by oxidation and/or coagulation. Oxidants such as chlorine, hypochlorite, chlorine dioxide, ozone, and potassium permanganate have been used successfully in pilot and plant scale operations for the removal of phenolic and other organics (Armco et al., 1951; White, 1972; Patterson, 1975; Reynolds and Shack, 1976). Coagulants such as various polyelectrolytes, manganese dioxide, alum and lime can also break emulsions and enhance gravity separation.

Of the oxidants mentioned above, chlorine and hypochlorite are very commonly used because of their application to disinfection of drinking water and sewage. The literature indicates that oxidation of phenolics by chlorine occurs most readily in the pH range of 7 to 10 (Armco et al., 1951). When dosage and/or reaction time are insufficient for complete oxidation, partial chlorination using chlorine or hypochlorite has the danger of producing chlorophenols, which tend to increase taste and odor problems (Morris, 1975). There also is a general concern that chlorination of some hydrocarbons may result in a release of potentially harmful compounds in the effluent (Kelley, 1975; Morris, 1975).

Chlorinated hydrocarbon production can be minimized or avoided by use of other oxidants either in combination with or in place of chlorine and hypochlorite. Ozone, chlorine dioxide and potassium permanganate have been found to oxidize aromatic hydrocarbons without the production of undesirable products (Armco et al., 1951; Carus, 1971; White, 1972; Johnson, 1975). Of these, ozone has the disadvantage of requiring on-site generation with

expensive capital and operating costs. Oxidation by potassium permanganate will result in the formation of manganese dioxide, a coagulant, and the production of significant quantities of sludge.

Although some investigations have identified trace chlorinated aromatic compounds produced by oxidation of phenolics with chlorine dioxide (Lindgren and Ericsson, 1969), pilot and plant scale operations using chlorine dioxide have shown that partial or complete oxidation of phenolics and COD can be achieved without formation of significant chlorophenols. Control of phenolic tastes and odors has required dosages of 0.3 to 10 pounds of sodium chlorite per million gallons of wastewater (White, 1972). Sodium chlorite is oxidized by $Cl_2$ to generate $ClO_2$ in most operations. Experimental oxidation of coke plant wastes showed that use of chlorine dioxide in combination with chlorine gas improved efficiency of using chlorine dioxide alone. Substantial elimination of phenolics appeared to be achieved in a period of 5 minutes or less (Armco et al., 1951).

Literature information and theoretical half-reaction stages for oxidation of organic compounds by chlorine dioxide indicate that a drop in pH can be anticipated as a result of the use of chlorine dioxide. Experimental use of chlorine dioxide to remove phenolics from coke plant waste with phenolic concentrations in the range of 80 to 200 mg/l resulted in a drop of up to 9.8 pH units. It appears that creation of both organic and inorganic acids is likely responsible for this change. Of the inorganic acids that may be produced, some have low dissociation constants, indicating they are strong acids. For example, $HClO_3$ could be produced during oxidation with chlorine dioxide and has a dissociation constant greater than 1, indicating it is a very strong acid (Johnson, 1975). HOCl, which is produced during conventional chlorination, is a weak acid by comparison with a dissociation constant of $2.9 \times 10^{-8}$.

To indicate the degree to which chemical oxidants might be effective in removing organics from the effluent from the gradient control system, several preliminary tests were conducted using sodium hypochlorite and potassium permanganate as oxidizing agents. Chlorine dioxide supplies for limited laboratory experiments could not be located.

For the oxidation experiments, ground water from Well 13 was diluted by 50% and by 98% with deionized water in an attempt to produce concentrations likely to be representative of effluent from the gradient control wells. Diluted samples were then oxidized with sodium hypochlorite (NaOCl) and potassium permanganate ($KMnO_4$) at concentrations based on literature information (Reynolds and Shack, 1976; Carus, 1971). A one-hour contact time was used to guarantee relatively complete oxidation reactions. After oxidation, NaOCl-oxidized samples were analyzed for phenolics, COD and pH. In addition, the most heavily oxidized sample from each dilution was analyzed for suspended solids and oil and grease, and each sample in the 50% dilution series was analyzed for biochemical oxygen demand. One sample was oxidized with $KMnO_4$ for comparison with NaOCl. This sample was analyzed for phenolics.

The results of these experiments are summarized in Table F-1 and show that both sodium hypochlorite and potassium permanganate were capable of oxidizing the organics from the middle drift aquifer. Phenolic removals were 12% or less where NaOCl dosages were not significantly greater than the theoretical requirement for complete decomposition. This is in agreement with the findings of others (Reynolds and Shack, 1976). Phenolic removals improved significantly with increased NaOCl dosage. On the other hand, COD removal appears to improve slightly with oxidant concentrations and with dilution. Since COD analyses do not measure aromatic hydrocarbons, this may reflect COD generation by the cleavage of aromatic rings partially compensating for COD destruction by chlorination. Oxidation efficiency appears to have been significantly higher with potassium permanganate than with sodium hypochlorite. This may have occurred because of a more specific affinity of $KMnO_4$ for phenolics, because of reaction pH, or for some other reason.

An undesirable byproduct of oxidation is the formation of suspended solids, especially with $KMnO_4$. After oxidation, suspended solids concentrations were measured in the samples oxidized with the highest hypochlorite dosages and were found to have increased by a factor of about two or more. Solids production in the sample oxidized with $KMnO_4$ was much more dramatic, with formation of a heavy sludge which occupied about 10% of the volume after a settling period of about 1 hour. Visual inspection of the remaining

oxidized samples the next day revealed that quiescent settling had removed substantially all turbidity from the samples.

In conclusion, experiment data indicate that the organics under study are amenable to treatment by chemical oxidation in a manner that is consistent with experience reported by others. High dosage requirements and sludge generation must be assumed if this is the only method of treatment employed. These processes appear to be helpful in breaking emulsions and enhancing gravity clarification.

Biological Treatment

Biological oxidation of phenolics and other organic wastes have received a tremendous amount of attention over the years. Trickling filters, activated sludge, oxidation ponds and other applications have been used on experimental and plant scale to remove COD, phenolics and aromatic hydrocarbons. In most cases, removal of emulsified oils to about 100 mg/l is necessary prior to biological treatment (Reynolds and Shack, 1976). This could complicate the use of biological treatment for direct oxidation of organics in the undiluted effluent from the gradient control wells. Examination of microbial degradation of these materials has led to isolation of various common microbes that are capable of oxidizing specific organics (McKenna and Heath, 1976; Cobb, 1973) and to the suggestion that toxic metabolic byproducts may be responsible for failure of unacclimated microbes to degrade some organics (Baird et al., 1974). Patterson (1975) and Reynolds and Shack (1976) present brief reviews of applications of biological treatment to oxidation of phenolics and creosote wastes. Removals of phenolics and COD ranging from poor to substantially complete removal are reported.

Several aspects of biological treatment must be considered in the treatment of organic wastes. First, all biological systems are susceptible to upsets due to variations in influent quality and to seasonal factors. Changes in waste strength, microbial nutrient balance, toxic chemical concentrations, hydraulic loadings, sunlight and temperature may affect the efficiency of the process. The production of biological solids can result in the need for sludge handling, although extended aeration can be used to

reduce the volume of sludge. To maintain aerobic conditions, oxygen supply systems are often needed. Biological treatment will need regular attention by trained personnel to control and maintain the treatment efficiency.

To examine the effluent from the gradient control wells for biological treatability, several tests were made using various ground water samples. These tests are summarized in Table F-2. They were conducted to indicate the biochemical oxygen demand of the raw water and to indicate whether or not prior chemical oxidation would seriously affect biodegradation.

Variations in 5-day BOD of samples taken June 2, 1977 may reflect variations in organic species found among the different sources. Failure of BOD tests to yield results for most samples probably reflects a combination of dilution in the BOD bottles and toxic effects due to the complex nature of organics present in the ground water. As the data indicates, the 5-day BOD's of samples taken June 2 from Well 13 and Well 17 were about 2,000 mg/l and 30 mg/l, respectively.

Other BOD experiments were run with samples collected June 22, 1977 after 50% dilution with deionized water and oxidation with NaOCl. The 5-day BOD's of these samples were in the range of 2,000 to 3,000 mg/l, indicating that the 5-day BOD of the raw ground water obtained June 22 may have been in the range of 4,000 to 6,000 mg/l. This conclusion is supported by the fact that raw water COD was significantly higher on June 22 than on June 2. Reduction of toxic compounds due to chemical oxidation and variations in microbial seed or nutrient availability may also have been responsible for this change in BOD. While a sample of domestic sewage was used as the seed on June 2, water taken from the storm water pond south of Lake Street in the study area was used as the seed source in the second set of experiments, on the theory that these microbes might be better acclimated to metabolize phenolics and other aromatic hydrocarbons.

Data from the BOD tests of June 22 provide sufficient information to estimate BOD kinetic parameters for the oxidized ground water. Once initiated, microbial activity was vigorous and results indicated first order BOD reaction rate constants, K (base e), in the range of 0.6 to 1.2. The ultimate

carbonaceous BOD, L, was estimated to range from 2,500 mg/l to 3,200 mg/l. Both K and L may increase with better acclimated microbes or other factors. Values of both K and L were found to decrease somewhat with heavy applications of NaOCl during pretreatment, probably as a result of the chemical oxidation. Compared with "strong wastewater"--where K and L values of about 0.4 and 250 might be expected (Fair et al., 1968)--this indicates an extremely strong wastewater and very rapid microbial response. Based on this information, substantially complete removal of metabolizable BOD should take place within about 4 to 8 days.

These BOD analyses are consistent with the complexity of the organic chemicals present in the ground water, the variations in water quality parameters throughout the study area, the high concentrations of oxygen-demanding substances in various ground water samples and the difficulties inherent in analyses of biodegradation where unusual compounds and potential toxins are present. Results do indicate that these organics should be biodegradable, especially when acclimated microbes are available, and that pre-treatment by oxidation with hypochlorite does not seriously inhibit biodegradation. Additional testing would be necessary to define the biodegradability of these organics more accurately.

TABLE F-1

EFFECTS OF CHEMICAL OXIDANTS ON QUALITY OF GROUND WATER[a]

| Oxidant Dosage (mg/mg phenols) | Dilution Ratio[b] | Approximate Initial Phenols (mg/l)[c] | Final Phenols (mg/l) | Percent Removal | Approximate Initial COD (mg/l)[c] | Final COD (mg/l) | Percent Removal | Approximate Initial Suspended Solids (mg/l)[c] | Final Suspended Solids (mg/l) | Final pH[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.9 NaOCl | 1:2 | 25 | 22 | 12 | 20,100 | 11,300 | 44 | -- | -- | 8.0 |
| | 1:50 | 1.0 | 2.5[e] | None | 800 | 384 | 52 | -- | -- | 7.1 |
| 11.4 NaOCl | 1:2 | 25 | 7.5 | 70 | 20,100 | 11,000 | 45 | -- | -- | 8.5 |
| | 1:50 | 1.0 | 0.38 | 62 | 800 | 376 | 53 | -- | -- | 7.9 |
| 52.2 NaOCl | 1:2 | 25 | 2.2 | 91 | 20,100 | 10,500 | 48 | 240 | 463 | 9.1 |
| | 1:50 | 1.0 | 0.088 | 91 | 800 | 384 | 52 | 10 | 61 | 8.5 |
| 14 $KMnO_4$ | 1:2 | 25 | 3.0 | 88 | -- | -- | -- | -- | -- | -- |

[a]All samples reacted for 1 hour prior to chemical analyses.

[b]Raw water was diluted with deionized water. Raw water had 50 mg/l phenols, 40,200 mg/l COD, 486 mg/l suspended solids, and pH 7.5. Source of raw water was sample taken from Well 13.

[c]Initial concentrations estimated based on dilution factors.

[d]pH was primarily influenced by the pH of the concentrated oxidant (12.6). Little or no change was observed during reaction.

[e]Inconsistent data. Probably reflects uneven distribution of organics in raw water prior to dilution or an error in analysis. Raw water was shaken thoroughly before samples were withdrawn.

TABLE F-2

SUMMARY OF BIOCHEMICAL OXYGEN DEMAND DATA

A. 5-Day BOD of Samples Taken June 2, 1977

| Source | Volume of Sample in 303 ml BOD Bottle (ml)* | | | | | |
|---|---|---|---|---|---|---|
| | 0.03 | 0.5 | 1.0 | 3.0 | 10.0 | 30.0 |
| Well 5 | ND | ND | ND | ND | ND | ND |
| Well 6 | ND | ND | ND | ND | ND | ND |
| Well 9 | ND | ND | ND | ND | ND | ND |
| Well 13 | ND | 2,200 | 1,700 | ND | ND | ND |
| Well 17 | ND | ND | ND | ND | ND | 30 |

B. 5-Day BOD of Well 13 Samples Taken June 22, 1977 After 50% Dilution With Deionized Water and Chemical Oxidation With NaOCl

| NaOCl Dosage (mg/l) | Volume of Sample in 303 ml BOD Bottle (ml)* | | | |
|---|---|---|---|---|
| | 3.0 | 1.0 | 0.5 | 0.1 |
| 72 | >460 | >1,400 | >1,500 | 3,000 |
| 280 | >460 | >1,400 | >1,400 | 1,800 |
| 1,300 | >460 | >1,400 | >1,600 | 2,400 |

*Balance of bottle was filled with deionized water.

ND means "non detected."

ecology and environment, inc.
223 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60606, TEL. 312-663-9415
International Specialists in the Environmental Sciences

DATE: December 8, 1980

TO: File

FROM: Rod Bloese RTB

SUBJECT: Minnesota/TDD# F5-8012-3
St. Louis Park/Reilly Tar and Chemical Co.

On December 3, 1980, the author met with Melanie Toepler (USEPA - Region V Enforcement) to obtain background information concerning the subject site. Areas to be addressed in developing cost estimates for clean-up of groundwater and soil in the subject site area were discussed. Subsequently, background information was reviewed and the following scope of work was determined.

Cost estimates for the following areas will be determined:

1. Water treatment of all fifteen (15) St. Louis Park Municipal wells and a number of additional wells.

2. Remedial activity (clean-up) regarding on-site well #23.

3. Remedial activity regarding approximately fifteen (15) "multiaquifer" wells.

4. Contaminated soil treatment, clean-up, and/or disposal.

5. Well field management plan.

Presently, background review is continuing and cost estimate work for the above five (5) areas are being initiated.

RB/df

recycled paper

2

All will be RFWC - XX RT.

5/24/83 ~~RFWC-1RT~~ FINAL REPORT - STUDY OF GROUNDWATER CONTAMINATION IN ST. LOUIS PARK, MINN. Dept. of Health. Nov. 1981 E.A. Hick

5/24/83 ~~RFWC-2RT~~ APPENDICES TO RFWC-1

5/24/83 ~~RFWC-3RT~~ Report on DRINKING WATER TREATMENT AND REMEDY EVALUATIO FOR ST. LOUIS PARK MINN. APRIL 1981 AND Rough Draft RFWC-

5/24/83 ~~RFWC-4RT~~ COPY OF LOGS 06-02 RJM ~~06~~, RJM 07-06, 06-03, 06-04, 06-0

RFWC-5RT FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTES CONT NO. 68-01-6056 COST ESTIMATE FOR CLEAN UP OF CONTAMINATED GROUNDWATER AND SOIL AT THE REILLY TA AND CHEMICAL COMPANY FACILITY ST. PAUL MINN.

6RT Superfund Program / NEPA COMPLIANCE (FILE R-

7RT Remedial Response Fact Sheet (FILE R-1)

8RT Copy of Logs 06-01, 06-19 (WORK SCOPE) (FILE R-2)

9RT 1/21/82 Revised S. of Work MPCA to Hickok. (FILE R-2)

10RT TIME LINE Chart. 2-25-82 (FILE R-2)

11RT 1-18-82 ST. LOUIS Park CONCERNS AS TO Approach (FILE

12RT 22-JAN 82 Letter to Bitter Reassignment of manpower (FIL

13RT 12/18/81 Letter to Bitter Summarizing Hickok Report Deficiencies. (FILE T1-1) (Task 1)

14RT 1-20-82 Letter from P. Bitter Summarizing Hickok Report Deficiencies Task 1, (FILE T1-1)

15RT 3/8/82 Letter W/Carbon Isotherm Data (FILE T1

16RT Rough Draft E/A. Hickok Nov. 81 Report. (FILE T

17RT Log 05-03 copy 4 Oct. 21, 1981 - Workplan 2-2-8 (FILE

18RT ARNDORFER PROPOSAL (FILE R-2)

19RT Nov. 24 1981 - Mod. to No. 9 CONT. 68-03-1613

20RT NOV. 13, 1981 Non Disclosure letter EPA Ref. Polack (FILE

21RT Non-Disclosure Signatures (T. Olsen) (FILE R-1)

22RT " " " (FILE R-1)

23RT Superfund Reporting (FILE R-1)

24RT Authorization to WORK + WILLIS Conversation (FILE

25RT Phone Conv. R.W. Bull - Lederman + WILLIS 11/ (FILE T1-1)

26RT Rough Draft E.A. HICKOK Report (FILE T1-3)

27RT Cancer Study Report MINN. 12/12/81 (FILE T1-4)

28RT CLIMATE OF MINN. (FILE T1-4)

29RT ST. LOUIS Park COMMUNITY PROFILE. (FILE T1-4

30RT Sorption of Poly AH by Sed. + Soils Art (Means) (FILE T1-

| | |
|---|---|
| 31 RT. | Phone. Conversation (P.C.) Paul Bitter FILE TI-4 |
| 32 RT | P.C. — Bitter FILE TI-4 (RFW) |
| 33 RT. | P.C. — MILLMAN FILE (TI-4 (RFW) |
| 34 RT | P.C. — WINSLOW FILE TI-4 (MPCA) |
| 35 RT | P.C. — MDNR - Fish & Wildlife. FILE TI-4 |
| 36 RT | P.C. - ST. L. Park Chm. of Commer. FILE TI-4 |
| 37 RT | Task 2 - 2 wells Specs. FILE T2-1 |
| 38 RT | Nov. 12 & 18 Meeting Notes FILE R-4 |
| 39 RT | Dec 18 Meeting Notes FILE R-4 |

| LOG No. | DESCRIPTION | FILE LOCATION |
|---|---|---|
| RFWC-40RT | Proposed Work Scope of USGS | R-2 |
| 41RT | Meeting 2/24/82 | R-4 |
| 42RT | P.C. Bitter - Ref. Well Abandonment Prog. | R-1 |
| 43RT | TIMELINE - Bitter 3/23/82 | R-2 |
| 44RT | Work Assign. 2-2-6 March 9, 1982 Letter | R-2 |
| 44RT | M.J. No 12 to Cont. No. 68-03-1613 2/2/82 | R-2 |
| 45RT | Meeting Summary - 5 Apr. 82 | R-4 |
| 46RT | 12 APR 82 Progress Report | R-1 |
| 47RT | P.C. Bitter - Tr. Tech for Reilly Tar. | R-1 |
| 48RT | P.C. Bitter - Tr. Tech for Reilly Tar | R-1 |
| 49RT | P.C. Bitter - Tr Tech for Reilly Tar | R-1 |
| 50RT | Progress Report March | TI-1 |
| 51RT | PILOT PLANT EVALUATION (7 MAY 82) | TI-1 |
| 52RT | Progress Report May | TI-1 |
| 53RT | E/A Comments Paul Bitter 5/25/82 | TI-2 |
| 54RT | PILOT PLANT EVAL. (28 May 82) | TI-1 |
| 55RT | Progress Report. June | TI-1 |
| 56RT | MPCA E/A Comments. 6/14/82 | TI-2 |
| 57RT | MDH E/A Comments. 7/12/82 | TI-2 |
| 58RT | CH2M-Hill Contract Review. | TI-1 |
| 59RT | Letter from Paul Bitter | TI-1 |
| 60RT | Progress Report. Aug 82 | TI-1 |

| LOG No. | DESCRIPTION | FILE LOCATION |
|---|---|---|
| 61 RT | E/A FINAL DRAFT | T1-2 |
| 62 RT | Progress Report Sept. 82 | T1-1 |

WESTON
DESIGNERS CONSULTANTS

BY RJm DATE 2/24/82 DIV _____ SHEET 1 OF 2
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. RFWC-41KT
PROJECT Reilly Tar
SUBJECT Paul Bitter 886-3007

1) Finalize Hole Report Anal. } March 12, 1982
2) E/A Report

3) Bidder will send
Barr Reports
USGS Reports
Miter Report
Water Data???

4. Will send time chart
Next activity about May.

5. Will send letter expressing concerns
with regards to Standards, Health risk
definition.

6. No Coop Agreement.
a) No backlog of wells from Minn. Health Dept.

b) Refering to this as Piecemeal Well Abandonment
Program

c) Coop about April - review back to State
and contract out to RFW or others.

If to RFW ~~Start~~ Start at May 1
1981.

RFW 338-5-81

WESTON
DESIGNERS CONSULTANTS

BY RJM. DATE 2/24/82 DIV _____ SHEET 2 OF 2
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT Rally Tur
SUBJECT Paul Bidder 886.3007

7) Scope of work not to change.

O3 Task will be lengthly task - requiring more time - may have to renegotiate contract to increase $.

8) MINNI Meet. —

City now realizes EPA has an awareness of their problems.

City to go to W.D.C. to talk to National superfund and present their ideas.

9) Next visit will be in 2 wks. (~12 March)

RJM & R.S. to attend.

Bob to talk about encapsulation as he gave talk to EPA recently.

May be a research project along these lines for EPA $.

RFW 338-5-81

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Use Fact Sheet for Info.

Will use USGS. —

En. Ass on Hickok — at end of month
+ Input to RFP.

Response To task 1 + 2.

Paul's comments on Hickok.

City + EPA share same views at this time. Motivation is to get authority of Superfund ~~not~~ monies. + drinking water.

2/28/82 Env. Ass. of Hick Report.

Call Paul Next Monday on Tasks 1 + 2.
2/9/82

E.A. Action is better than No Action
No. B.S. Eliminate Filler.

WESTON

BY _____ DATE 1/2/82 DIV _____ SHEET _____ OF _____

CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____

PROJECT _____

SUBJECT _____

Paul Bitter
Tony Rotter

Paul Bitter.

Response of St. L. Park to Hichkok

Omc. Status.
Responsiveness - 1 key person who knows everything about a project.
Up to minute Status
Weekly Status to OSC -
Keep Time commitments.

Approach -
Viable Alternatives only.

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Sunday low mid week high.

Present system deep-tank with sponge.

Upset — solids lost.

Some types of operation etc.

~~[illegible]~~

2nd piece of study.

Expansion Const. pilot studies

Needs in proposal

No lump sum.

time charges — multiplier personnel for job.

Best estimate of time and costs.

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Reilly TAR

January 18 Progress Report P. Lederman.
Request.

pg. 1.
2nd ¶ change COE to USGS.

3rd ¶ Weston provided comment on Report.
2nd to last line.

pg. 2 No 2 Work Ass. Sum.
1st sent.

Must provide environmental comments on Report.

Performed tech. comments only.

Addendum to comments.

1. P. not agree. State & EPA. Fact Sheet.
2. Hick. report.
3. Do. Env. assess. — #1
4. Coop agree.

Hickcock — { 1. 2. } Int. this week. { Removal of Conc. H. & PNA for 2 wells. Comp. Survey of all wells 50-60. envir assessment.
3. Treatability.

As each well is drilled R.A must be recommended and we must evaluate

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Task 3. Deficiency of HRR Report – Treatability of groundwater. Adm MPCA

Being Revised – No PAC System Design.

Increasing scope of work to bench test groundwater. due to PNA Treatability. then to pilot if anything looks promising.

HRR Report – Comments are OK. but no direction.

Gavity & Miller – MIR Lab.

Found out how they are getting 1 ng.

Bill Horn – Call by Pete to find out about treating tests of PNA. in WTP.

3 ng. will require measuring with black column..

We have

Dec. 16 or 17 Trip Report copied to Weston.

What are Alternative Sources of water.

Schdvale – RFP this month.

Paul will update fact Sheet & CPM.

While discussing the project with Paul Bitter, another topic came up. This involves the handling and analytical protocol for analysis of polyaromatric hydrocarbons. A contractor has been selected to do analytical work. They have proposed collecting the samples in brown glass bottles with teflon lined caps, cooling them (I'm assuming this) and sending them to their Alabama laboratory from Minnesota. Weston personnel raised a question the suitability of this protocol to assure that adequate data results from the analysis.

Action item is for Thorsen to talk to Jim Smith and Bob Schoenberger to determine if there are any concerns that must be addressed with regard to this procedure.

cls/

2

All will be RFWC - XX RT

5/24/83 RFWC-1RT Final Report - Study of Groundwater Contamination in St. Louis Park, Minn. Dept. of Health. Nov. 1981 EA. Hickok.

5/24/83 RFWC-2RT Appendices to RFWC-1

5/24/83 RT Report on Drinking Water Treatment and Remedy Evaluation for St. Louis Park Minn. April 1981 and Rough Draft RFWC-1&2

5/24/83 RFWC-4RT Copy of Logs 06-02 RJM, 07-06 RJM, 06-03, 06-04, 06-05

RFWC-5RT Field Investigations of Uncontrolled Hazardous Wastes Sites. Cont No. 68-01-6056 Cost Estimate for Clean up of Contaminated Groundwater and Soil at the Reilly Tar and Chemical Company Facility St. Paul Minn.

6RT Superfund Program / NEPA Compliance (File R-1)

7RT Remedial Response Fact Sheet (File R-1)

8RT Copy of Logs 06-01, 06-19 (Work Scope) (File R-2)

9RT 1/21/82 Revised S. of Work MPCA to Hickok. (File R-2)

10RT Time Line Chart. 2-25-82 (File R-2)

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16RT Rough Draft E/A. Hickok Nov. 81 Report. (File T1-2)

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18RT Arndorfer Proposal (File R-2)

19RT Nov. 24 1981 - Mod. to No 9 Cont. 68-03-1613

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23RT Superfund Reporting (File R-1)

24RT Authorization to Work & Willis Conversation (File R-1)

25RT Phone Conv. R.W. Bull - Lederman & Willis (File T1-1) 11/30/81

26RT Rough Draft E.A. Hickok Report. (File T1-3)

27RT Cancer Study Report Minn. 12/12/81 (File T1-4)

28RT Climate of Minn. (File T1-4)

29RT St. Louis Park Community Profile. (File T1-4)

30RT Sorption of Poly AH by Sed. + Soils Art (Means) (File T1-4)

| | |
|---|---|
| 31 RT. | Phone. Conversation (P.C.) Paul Bitter FILE TI-4 |
| 32 RT | P.C. — Bitter FILE TI-4 (EPA) |
| 33 RT. | P.C. — Millman FILE (TI-4 (USFW) |
| 34 RT | P.C. — Winslow FILE TI-4 (MPCA) |
| 35 RT | P.C. — MDNR - Fish & Wildlife. FILE TI-4 |
| 36 RT | P.C. - St. L. Park Cham. of Commer. FILE TI-4 |
| 37 RT | Task 2 - 2 wells Spaces. FILE T2-1 |
| 38 RT | Nov. 12 & 13 Meeting Notes FILE R-4 |
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| LOG No. | DESCRIPTION | FILE LOCATION |
|---|---|---|
| 61 RT | E/A FINAL DRAFT | T1-2 |
| 62 RT | PROGRESS Report Sept. 82 | T1-1 |

WESTON
DESIGNERS CONSULTANTS

BY RJm DATE 2/24/82 DIV _____ SHEET 1 OF 2
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. RFWC-41KT
PROJECT Reilly Tar
SUBJECT Paul Bitter 886-3007

1) Finalize H.R. Report Cmdl. } March 12, 1982
2) E/A Report

3) Bidder will send
Bart Reports
USGS Reports
Miter Report
Water Date ???

4. Will send time chart
Next activity about May.

5. Will send letter expressing concerns
with regards to Standards, Health risk
definition.

6. No Coop Agreement
a) No backlog of wells from Minn. Health Dept

b) Refering to this as Piecemeal Well Abandonment
Program

c) Coop about April - review back to State
and contract out to RFW or others.

If to RFW ~~Start~~ Start at May 1
1981.

RFW 338-5-81

WESTON
DESIGNERS CONSULTANTS

BY RJM. DATE 2/24/82 DIV _____ SHEET 2 OF 2
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT Reilly Tar
SUBJECT Paul Bidder 886.3007

7) Scope of work not to change.

O3 Task will be lengthly task - requiring more time - may have to renegotiate contract to increase $.

8) MINNI Meet. —

City now realizes EPA has an awareness of their problems.

City to go to W.D.C. to talk to National superfund and present their ideas.

9) Next visit will be in 2 wks. (~12 March)

RJM & R.S. to attend.

Bob to talk about encapsulation as he gave talk to EPA recently.

May be a research project along these lines for EPA $.

RFW 338-5-81

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Use Fact Sheet for Info.

Will use USGS. —

Env. Ass on Hickok — at end of month

+ Input to RFP.

Response To task 1+2.

Paul's comments on Hickok.

City + EPA share same views at this time. Motivation is to get authority of Superfund ~~not~~ monies. + drinking water.

2/28/82 Env. Ass. of Hick Report

Call Paul Next Monday on Tasks 1+2.
2/9/82

E.A. Action is better than No Action
No B.S. Eliminate Filler.

WESTON

BY _____ DATE 1/2/82 DIV _____ SHEET _____ OF _____

CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____

PROJECT _____

SUBJECT _____

Paul Bitter
Tony Rotter

Paul Bitter.

Response of St. L. Pak to Hichkok

Omc. Status
Responsiveness - 1 key person who knows everything about a project.
Up to minute status
Weekly status to OSC -
Keep time committments.

Approach -
Viable alternatives only.

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHECKED BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Sunday low mid week high.

Present system deep-tank with sponge.

Upwest — Solids lost.

Some types of operation etc.

~~[illegible]~~

2nd phase of study -

Expansion Const. pilot studies

Needs in proposal

No lumps on.

time charges — multiplying personnel for job.

Best estimate of time and costs.

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Reilly Tar

January 18 Progress Report P. Lederman.
Request.

pg. 1.
2nd ¶ change COE to USGS.

3rd ¶ Weston provided comment on Report
2nd to last line.

pg. 2 No 2 Work Ass. Sum.
1st sent.

Must provide environmental comments on Report.

Performed tech. comments only.

Addendum to comments.

1. P. not agree. State & EPA Fact Sheet.
2. Hick. report.
3. Do. Env. assess. — #1
4. Coop agree.

Hickrock — { 1. 2. } Int. this week. { Removal of Conc. H. & PNA from 2 wells. Comp. Survey of all wells 50-60. envir assessment.
3. Treatability.

As each well is drilled R.A must be recommended and we must evaluate.

WESTON

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Task 3 Deficiency of Hill Report - Treatability of groundwater. Adm MPCA

Being Revised - No PAC System Design.

Increasing scope of work to bench test groundwater. due to PNA treatability. then to pilot if anything looks promising.

Hill Report - Comments are OK. but no direction.

Gavity & Miller - MIR Lab.

Found out how they are getting 1 ng.

Bill Hann - Call by Pete to find out about treating tests of PNA. in WTP.

3 ng. will require measuring with black columns..

We have

Dec 16 or 18 Trip Report copied to Weston.

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Schdvale - RFP this month.

Paul will update fact Sheet & CPM.

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Action item is for Thorsen to talk to Jim Smith and Bob Schoenberger to determine if there are any concerns that must be addressed with regard to this procedure.

cls/

Lamar,

Please call Jim Lucas (acting dir.)
ORD / HERL - Epidemology
684 - 7429

& ask him to fund grant to Univ. of Minnesota to study increased cancer rates in St. Louis Park (Reilly Tar). This is very important to our case. Reilly will probably use previous (non-conclusionary study) against us in court.

National Cancer Survey.

Jack Saul Man lost his job & left - project is dead.

Happy to do it - furnish the $ & give the ck.

Get studies to Betty Anderson

evaluate results of previous studies

Epidemiology

Mandell proposed study

1979 - 1981 - 3 yrs.

only look at SLP

Andy Dean — MDH

612 - 296 - 5212

No cancer registry

Who heads CDC

ask Lamar Miller

Selkirk and Bin

each

1. Verbal & ~~written~~ consultation on protocol for mutagenicity testing
   2 hours
2. Written report on #1 < 20 pages
3. Telephone Consultation with labs performing mutagenicity Testing
   ≤ 8 hours.
4. Telephone consultation with EPA/DOJ / Minnesota.

   < 16 hours.

6.

6.1 Report on (1) results of mutagenicity testing as how it supports case
   (2) final data assessment report based on 6(1) & 5 & draft data ass. report
5. Literature review to complete review. [consult experts]

   < 40 hours.

2 Trips ? → May not need to be taken.
   → 1 to Min 2 days ea. case devel.

Pre-trial & trial under justice.

Transport [redacted] Dr. Olaf Pfannkuch

New well in P.d.C. on Reilly property

W 23 gook
W 23 water
SLP 15
new P d C. – W 300
Drift W 13
Drift → Peter W 117 } another well
~~P 14~~ W9
Clean soil (sand)
Dirty soil (sand)
Clean peat
Dirty peat

Kemple

Testified only hearing

Must review data

5/13 HPLC has problems

Capsule Labs working for SLP

Thinks GCMS will work at ng/l

protocol – sampling present at
present at work

Kimble

Computer evaluation

~ 8 hrs. per GCMS run per fraction

MRI –
USGS –
GCA –

Capsule ?

Comparing new GCMS data to previous

Ames – SRI International

$$\begin{array}{r} 8 \\ \hline 16 \end{array} \qquad \begin{array}{r} 8 \\ \hline 24 \end{array} \qquad \begin{array}{r} 24 \\ 20 \\ \hline \end{array}$$

call Wed. morning

# Scope of Work

Kimble

1. Review GCMS data

   [MRI – R.C.
   USGS – Denver]

   Travel –

2. [ analyses ]

   At least W-23 tar & water
   Present at sample

3. Report – interpreting

4. Testimony preparation
   2 trips

5. Testimony

   1 man-week 1 trips

check with Kimble

Kimble

1. Oversee - sampling & analysis 16
site visits - 4 (Minneapolis) 4
2. Capsule labs. OVERHEAD ISSUE 20
~ 6 samples (sites) (soil or liquid) 16
Implement EPA approved
Kimble's protocol
3. Kimble's report on #1 & 2
i.e. ID all pollutants in 6 samples
semi-quantitative analysis
4. Available for conference calls
several
~~5. Pretrial meetings - Minneapolis~~
~~2 trips 2 days each~~
~~6. Trial - Minneapolis~~
~~1 week~~

0. a. Type outline 8
b. EPA reviews - comments
c. ~~[illegible]~~ Final report - S&A 16
protocol 8

Input: Kosakowski, Rosing

5. Review & input miscellaneous analytical
reports

Must be present.
Ardelman → No
Crump → Maybe

Dr. Crump

CEQ risk assessment
ground water assessment
risk based on animal data

EPA Environmental –
assessments water quality criteria

Not familiar with PAH would
have to review.

Additive risk

— Need data on relative potentcy
of compounds.

Previous Testimony for FDA
18 mos. dimethyl sylvesterole
Testimony at hearings
Canadian – asbestos
To go before Senate

Consulted for industrial groups
CMA and API,

— Delay conference call another week

-2

Via phone call with Cindy Patrick of Lise Systems I was told:

6-21-82 Julian Andelman was paid $500 by Lise Systems

12-31-82 Agreement with Lise Systems terminated

Gary England - St. Louis Park.
Review proposals - consult with consultants on what to do.

St Louis Park

5 wells down fluoranthene

I may go down due to

PAH presence

PAC. to remove PAH add at pumps & take out @ iron filters.

Dr Love 7281

Assist. on research to help pilot work.

Jim Symons can we have expert come visit.

Technical Asst.

Financial Asst.

Dr. Love [redacted] QA. Sau[illegible]

$120,000 State RFP.

for study of source of problem

Love

PAHs bad.

suggest other sources

Steve Greenwood.

Kent Sirell 684 ~~4372~~

P.A.H. paper Sept 1979.

Nuclear Magnetic resonance

Ba. Probe

Notes: St Louis Park g-w contamination

1. No g-w related grant funds ✓
2. Emergency Powers (SDWA) - no remedial action provisions ✓
3. Tech support
   a. S&A
   b. SWPS
   c. Kerr Lab - upon request
   d. SW
4. Potential funding would be discretionary
5. Note T Gorling letter re #1
6. Richard Wadle (MDH - DEH director) letter to Thomas T. Feeney HUD which was carboned to GRA & S Gordebring
7. HUD letter saying go ahead
8. Data Re Site

WE Anderson info attachment

Reilly Tar and Chemical Company
(Coal tar distillation & wood preservation)

Pollution: phenolic & polynuclear aromatic hydrocarbons
Depths to 50 ft
Distance of travel 1,000 ft to SE @ 30 & 50 ft

Costs significantly less than those estimated by PCA for initial study
80 acre tract

Carolyn Grabill - C

Creosote Plant St Louis Park

Person Dr. Rich Wade

612/296-5320

[redacted]

## The Administrative Order

On August 1, 1984, an Administrative Order was issued by U.S. EPA to Reilly Tar pursuant to Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9606(a). The Order required that Reilly Tar install, operate and maintain a granular activated carbon (GAC) water treatment system at the St. Louis Park municipal drinking water wells designated SLP 15/10. The determination that a GAC treatment system is the ~~cost-of~~ cost-effective remedy which will provide adequate protection of public health, welfare and the environment was made by

U.S. EPA pursuant to a Record of Decision which was signed on June 6, 1984 by Lee M. Thomas, who was Assistant Administrator at that time. This decision was made only after extensive studies had been ~~made~~ undertaken at the site and a thorough consideration had been given to all of the feasible drinking water supply alternatives, ~~for~~ and as set forth in the affidavit of Paul Bitter. As discussed above, Reilly Tar, the United States and the State of Minnesota in the process concerning the ~~selection~~ determination of the appropriate remedy which was selected pursuant to the Record of Decision.

was afforded substantial opportunity to participate with

¶ In the Administrative Order, Reilly Tar was advised that the Administrative Record which supported

the Findings, Conclusions and Order was available for review at the offices of U.S. EPA, Region V in Chicago. In order to accomodate Reilly Tar, those documents in portions of the Administrative Record which Reilly did not have, were copied and sent to Reilly Tar.

¶ The Administrative Order also provided Reilly Tar with the opportunity to request a conference with U.S. EPA. At the conference, which was required to be held within 31 days of the issuance of the Order, Reilly Tar was allowed to present objections, defenses or contentions which they had regarding the Order. Reilly Tar advised U.S. EPA of its desire to attend a conference regarding the Order, but that an extension of time would be necessary. Consequently, On September 11, 1984, Valdas V. Adamkus, Regional Administrator,

issued an Order, temporarily staying the effective date of the Administrative Order so that the company could meet with the Agency without having to be concerned about being in violation of the ~~30~~ 31 ~~day time limit~~ September 1 deadline set forth by the Order. (A copy of the Order is attached hereto as Exhibit ___). ~~The effective date of the Order then became September 14, 1984.~~

¶ The conference with Reilly Tar was held on September 11, 1984. ~~[illegible]~~ The president, vice president, general counsel, chief outside counsel and contractor of Reilly Tar were in attendance. Reilly was then advised that the purpose of the conference was to provide the company with the opportunity

to challenge or ascertain the basis for the Order and its applicability to them. They also were advised that, pursuant to their request, the effective date of the Order had been extended to September 14, 1984 and that if Reilly did not commit to compliance with the Order by such date, the United States would proceed with the implementation of the GAC treatment system in St. Louis Park.

9 Reilly Tar raised several concerns during the course of the ~~meeting~~ conference. For example, Reilly was concerned about obtaining access to the City of St. Louis Park's drinking water system for purposes of complying

with the Order. The city manager, who was in attendance advised Reilly that access would be no problem and that, in fact, the city would probably be willing to operate the system. Numerous technical issues regarding the system were raised by Reilly. For example, Reilly's consultant, Calgon, Inc. stated that a different, less expensive GAC design could achieve the results called for by the Order. The United States agreed that such a design could be acceptable.

¶ On September 14, 1984 Reilly Tar agreed in writing to build and operate a GAC treatment plant in accordance with the documents which

the company submitted to the United States on the day of the conference. (A copy of such letter and documents is attached hereto as Exhibit ).

Reilly's offer was made contingent upon:

(1) a guarantee that the GAC system would work;

(2) that the agreement would ultimately be embodied in a Partial Consent Decree signed by the City, the State and the United States; (3) that Reilly preserved its alleged right to reimbursement in the event that the plant was determined to be unnecessary by the Court; and (4) that the parties would give further good faith consideration to the performance criteria.

On September 21, U.S. EPA advised Reilly that its ~~replied to Reilly's~~ offer to implement the GAC system could ~~agreeing~~

be acceptable if contingencies and specific details of Reilly's design could be worked out. Reilly was also advised that, while U.S. EPA could not agree with their third condition concerning reimbursement, the other ~~three~~ three conditions in their letter of September 14 could probably be satisfactorily addressed.

~~On~~ In October, 1984 U.S. EPA submitted a Partial Consent Decree and a response to Reilly Tar's ~~[illegible]~~ technical comments concerning the Administrative Order. (Copies of such documents are attached hereto as Exhibit ).

# Pursuant to paragraph 1 of the Administrative Order, Reilly Tar was required to develop and submit a complete design including plans and specifications for the construction

of a GAC treatment system at St. Louis Park municipal wells designated SLP 15/10 within sixty days of the effective date of the Order. Consequently, the design was due to be submitted ~~so~~ to U.S. EPA no later than November 13, 1984.

On November 13, U.S. EPA received a letter from Reilly Tar requesting an extension of sixty days from the date upon which the design was required to be submitted (Exhibit ). On November 30 an Administrative Order was issued by Regional Administrator, Valdas V. Adamkus granting Reilly's request for an additional sixty days within which to submit

(Exhibit ).

its design for the GAC system. ~~The~~ Such extension was appropriate because of Reilly Tar's apparent desire to comply with the Administrative Order and U.S. EPA's ~~that~~ short delay in submitting its comments concerning Reilly's proposed design for the GAC system.

9 On December 21, 1984 and January 11, 1985 Reilly Tar submitted its documents ~~concerning~~ ~~the~~ for the GAC treatment system (Exhibit ). ~~These~~ These documents were reviewed by U.S. EPA, its contractor and the State of Minnesota. Although Reilly's design appeared to be capable of achieving the performance criteria set forth in the Administrative

Order, Reilly had failed to include the necessary design information which was ~~required~~ necessary to show how Reilly intended the GAC treatment system to be ~~also~~ integrated with the existing municipal system at SLP 15/10. As a result, on March 4, 1985 U.S. EPA sent a letter to Reilly (Exhibit ), which advised the company that the design could not be approved as submitted and was required to be modified in accordance with Paragraph 4 of the Administrative Order.

~~7 The foregoing facts~~

~~4 It is clear from the above described chronology relating to the Administrative~~

During the entire course of proceedings concerning the Administrative Order issued on August 1, 1984, U.S. EPA has made every effort to facilitate Reilly Tar's compliance with the Order. No request for extension or for assistance was denied. In its Memorandum in Support of Motion for Preliminary Injunction, Reilly, ~~attempts to~~ despite the clearly demonstrated good faith of U.S. EPA, claims that the Agency may attempt to jeopardize Reilly's efforts to prepare for trial by deliberately ~~timing~~ setting the timetable to ~~interfere with Reilly's case~~ so interfere with Reilly.

¶ Such ~~a false~~ an accusation by Reilly Tar is highly insulting to the Agency and is strenuously denied. As Reilly is aware, the company had ten days from receipt of the March 4, 1985 notification letter to submit the relatively minor modifications to the design, as discussed above. ~~[illegible]~~ Such timetable is more than ample to submit the minor design modifications. Nevertheless, U.S. EPA has demonstrated its willingness to ~~grant~~ grant schedule extensions for ~~upon the showing of~~ good cause. Following receipt and approval of such minor modifications, Paragraph 5 of the Administrative Order provides Reilly Tar with a period

MEMORANDUM

FROM : Bob Leininger
TO : SWERB, Schaefer, Ullrich
SUBJ: Reilly Tar
DATE : 3-14-85

Here is a copy of the brief which was filed on March 12 in opposition to the motion of Reilly Tar for preliminary injunction.

Reilly's motion seeks to enjoin the U.S. from assessing penalties against Reilly Tar for failure to comply with a CERCLA §106 Order which was issued to them by Region V on August 1, 1984. The hearing on the motion is set for March 22 in Minneapolis.

In support of its motion, Reilly Tar argues that the penalty aspects of the Order are such that their procedural due process is violated. In support of their motion, Reilly Tar cites the Aminoil decision which was rendered last September in the Central District of California which was unfavorable to the U.S.

C. Chemical
exception

The analysis of the coal tar distillation / wood preserving site in St. Louis Park, Minnesota preformed by Barr Engineering Co. has shown that contamination has occurred to the glacial drift ground water systems and ~~that the waste in the drift is a potential that~~ also and has slightly contaminated the underlying bedrock ground water aquifers. As part of the redemial actions a major recommendation of the report is that the identified coal-tar wastes in the glacial drift and Platteville aquifer be controlled by gradient control wells. Under this technique, a system of pumpout wells are placed in the aquifer to intercept the wastes. Water from the gradient control wells can be discharged to the sanitary sewer system, treated and discharged to Minnehaha Creek, or a combination of these two disposal locations can be used.

Besides contamination to the upper aquifers, the deeper aquifers in the Mt. Simon - Hinckley FORMATION have been slightly contaminated by the waste. The community of St. Louis Park and various industries have ~~had~~ abandon wells in the area. Realizing the purpose of this evaluation is to develop an order-of-magnitude cost estimate for the redemial activities at the site a number of assumptions must be made to complete the estimate. The first major assumption is that the deeper aquifers identified above must also have redemial actions. The following sections the necess

to complete THE order-of-magnitude cost estimate for treatment and disposal of the CONTAMINATED ground water ~~below the site~~.

## Wastewater Quantities and Characteristics

Characteristics of the waste water from the glacial drift gradient control wells have been preliminarily developed ~~by~~ in the Barr Engineering report. In lieu of the study presently being preformed by the USGS these values are the best available. Table #1, column A, attached summarizes the wastewater quantities and characteristics for the glacial drift control wells. The report projected the ground water quality from data collected during the study and over the previous few years. A range for the characteristics is presented in the Barr report, however for purposes of this report the maximum value will be used because a treatment ~~plant~~ system must be designed for the maximum loading. In accordance with this philosophy of being conservative the projected flow of 45 gpm was increased to 100 gpm.

Also on table 1 in column B the characteristics of the Platteville (100 gpm), St. Peter (100 gpm), and Prairie du Chien-Jordan (225 gpm) are projected using values from the same report. The values are the low end of the range presented for THE down gradient control wells from the glacial drift and are applied to these (which are in brackets) were developed ~~to~~ DEINE conservative. The

from experience and using good engineering judgement. ~~The~~ Column D on the same table combines the two shallow aquifer projected waste streams. These two streams have been combined because they are the most contaminated streams ~~which~~ and will ~~have a~~ probably have a high degree of variability. ~~Their disposal will be addressed later in this report~~. The Polynuclear Aromatic Hydrocarbons that have been tentatively identified are as follows:

| | |
|---|---|
| naphthalene* | acenaphthene |
| pyrene* | dibenzofuran |
| anthracene ~~or~~ phenanthrene*1 | fluorine |
| fluoranthrene* | benzophenanthene |
| methyl naphthalenes | benzofluoranthene |

This streams disposal will be discussed later in this report.

The characteristics of the deep Mt. Simon-Hinckley aquifer are projected ~~as~~ in column C on ~~the same~~ table 1. Lacking other data ~~on~~ the following assumption was made: The deep aquifers ~~of~~ are contaminated with the same waste as the glacial aquifer, therefore the pollution characteristics will be similar to the glacial drift, just diluted by a factor. The dilution factor was applied ~~developed~~ using the ~~following~~ methodology that if the concentration of similiar pollutants are know for both aquifers then the ratio between the two can be applied to ~~the other variables~~ unknown parameters. ~~This~~ Even tho this is not theoritically accurate, it will procedure an approximate order of magnitude value. After the 100 minute

pumping test conducted on the on-site Mt. Simon-Hinckley well there was a phenolic concentration of 0.005 mg/l. Taking the ratio between this value and the 3 mg/l projected ~~by B~~ for the glacial drift yields a dilution factor of 0.00167. Applying this factor to the remaining ~~values~~ parameters in column A on table 1 yielded the remaining values in column C. for the Mt. Simon-Hinckley aquifers. It must be stated that before any remedial actions are actually suggested for this aquifer it must be characterized by an extensive sampling program. However, in order to develop a cost estimate the values on table 1 which are felt to be conservative will be assumed representative of the source. To control the pollution in this ~~well~~ aquifer by gradient control wells, the maximum drawing force of 1500 gpm from the municipal wells must be equalized by a cone of depression created by the new wells. Therefore a pumpage rate of 1500 gpm is assumed to be the flow necessary for ~~the~~ the deepest gradient control wells.

DISCHARGE of gradient control wells.

The disposal of the ground water can be ~~handled~~ by two routes – discharge to the sanitary sewer or discharge to the MINNEHAHA creek after appropriate treatment if necessary. Alternatives can be devised that will combine these two routes.

Since the discharge of the 1500 gpm from the MT. SIMON-HINCKLEY aquifer is ~~the easiest~~ easier, the report will address ~~the~~ its disposal first. Table 2 presents the standards for discharge of storm water from the site to the Minnehaha Creek (these values were abstracted from the BARR Engineering Report). Comparison of these values to those projected in column C on table 1 shows that the waste can be discharged directly to the creek.

The discharge of 525 gpm (0.756 MGD) from the gradient wells is not ~~as easy~~ quite as easy. Due to regulatory constraints the water quality parameters of most interest in the discharge from the ground water gradient control wells include phenolic substances, polynuclear aromatic hydrocarbons, chemical oxygen demand, and oil and grease. Even tho a majority of the identified organic pollutants are reported to be biodegradeable it is not recommended that the waste be discharged directly to the sanitary sewer system because of the

to the 25 a

(and has a toxic effect on the microorganisms)
undiluted waste reaches the plant. Therefore pretreatment is necessary before discharge to the sewer.

To date the development and sizing of the treatment alternatives for the waste streams has been based upon theory, and a few preliminary tests using samples obtained from a ~~few~~ couple of wells. Initially the ~~pumps and~~ gradient control wells are expected to have a highly variable wastewater pollutant loading where the potential for upsets, equipment failure, and other unusual non-equilibrium conditions are great. Therefore, any waste treatment system must ~~be able~~ provide maximum flexibility and adaptability to handle wide fluctuating conditions. ~~Therefore~~, This would eliminate biological treatment which is prone to upsets during non-equilibrium conditions. ~~and direct~~ The most attractive approach to insure reliability and compliance of treatment facilities would be a physical/chemical treatment approach with discharge to the sanitary sewer system which reportedly can handle an additional flow of 0.756 MGD (with minimum problems) after continual operation it is feasible that after treatment the waste could be discharged ~~to~~ directly to the river.

seable

HYPOTHETICAL

Potential Facilities for Treatment of the Waste Stream

A brief description of a treatment facility which theoritically should be able to handle the projected waste stream from the shallow aquifers is as follow:

The initial unit process would be a equilization tank of 0.756 mG ~~to h~~ necessary to homogenize the waste, handle surges, and act as a buffer for equipment failure further down the treatment train. Next are facilities to break the emulsified organics and remove the oil and grease from the wastewater. This can be preformed by chemical oxidants and coagulants followed by either gravity separation or filtration. Chemical selection must realize that, it is preferrable to avoid or minimized oxidants which contain chlorine because of the possible production of chlorinated hydrocarbons. For purposes of this study it will be assumed that the chemical addition will be at one-half the oil ~~and~~ and grease concentration (producing a suspended solids concentration of 540 mg/l) and filtration will be ~~required~~ prefomed at a rate of ~~4~~ lbs/sq ft/hr. The discharge from the filtration unit will ~~be~~ be pumped to Activated Carbon columns which will absorb 0.05 lbs of phenol substances per lb of carbon (along with certain polynuclear aromatic hydrocarbons ~~[illegible]~~). The sludge produce by the facility will be transported to an approved ~~disposal~~ landfill and the effluent wastewater should initially be discharged to the city sewer.

P The above treatment facility is based on the PRELIMINARY bench scale tests as reported by Barvr Engineering, the characteristics coal tar waste and

good engineering judgement. Further information and testing is required before any decisions are ~~made~~ finalized. The tests to date have only touched the surface and the ~~treatment~~ treatment train was developed only for an order-of-magnitude cost estimate ~~only~~.

Facilities for the gradient control wells from the deep aquifers only requires an equalization basin to handle any unusual circumstances that might require the diversion of the waste to the city sewer systems and an effluent monitoring station.

CONCEPTUAL COST ESTIMATES

PREPARED BY E/E PERSONNEL

The capital cost was developed on a process-by-process basis using vendor estimates, Means Building Construction Cost Data, unit cost values from prior ~~completed~~ projects, and the like. The costs came from different sources, but all costs were escalated to ~~1st~~ 3rd quarter 1988 dollars using the Engineering News-Record Construction Cost Index of 2008. The capital costs of the individual processes were added for a total installed cost. Auxiliary costs (piping, electrical, instrumentation, and site preparation) are based on prior ~~Western~~ design experience and are calculated as a percentage of the installed costs. Engineering and contingencies are calculated as a percentage of the total construction cost and added to give the total capital cost.

Using the procedures described above, the total capital costs should be understood as accurate to +50% to -40%. This estimate does not allow for unusual site preparation, ~~additional power facilities, disposition of existing ponds or their contents, or a final outfall pipe and structure~~ OR OTHER UNUSUAL CIRCUMSTANCES INCLUDING LEGALITIES.

The conceptual capital and O/M costs estimates are presented on Tables 3 and 4. The total estimated conceptual Capital Cost is approximately 5,000,000 and the estimated and Maintenance Cost is _____.

Table

COAL TAR DISTILLATION / WOOD PRESERVING SITE
ST. LOUIS, MINNESOTA

Summary of Conceptual Operation & Maintenance Cost Estimate for Treatment of Creosote Contaminated Wells Wastewater

| ITEM | YEARLY COST | 35 YEAR COST IN 1981 DOLLARS |
|---|---|---|
| Power | 80,000 | 2,800,000 |
| Labor | 320,000 | 11,200,000 |
| Material | 100,000 | 3,500,000 |
| Chemicals | 400,000 | 14,000,000 |
| User Charge & Industrial Cost Recovery (1) | 1,200,000 | 12,000,000 |
| SLUDGE DISPOSAL | 20,000 | 700,000 |
| Taxes & Insurance | 50,000 | 1,750,000 |
| | | ~~45,950,000~~ |

TOTAL 35 year O/M 45,950,000
SA-146,000,000 capital

(1) The effluent will only be discharged for 10 years to the City treatment plant, the remaining years it will be discharged directly to the MINNEHAHA Creek

Table 1

COAL TAR DISTILLATION & WOOD PRESERVING SITE
ST. LOUIS PARK, MINNESOTA

## ESTIMATED ANTICIPATED ~~PEAK~~ PARAMETERS FROM THE GRADIENT CONTROL WELLS

| | A GLACIAL DRIFT AQUIFER | B PLATEUILLE ST. PETER PRAIRIE du Chien DOLOMITE | C DEEPER AQUIFERS | D A & B COMBINED |
|---|---|---|---|---|
| Phenolic Substances mg/l | 3 | 0.2 | 0.005 (2) | 0.733 |
| lbs/day | 3.60 | 1.02 | | |
| Chemical Oxygen Demand, mg/l | 1800 | 40 | 3 | 375 |
| lbs/day | 2161.73 | 204.16 | | |
| Oil and Grease, mg/l | 1700 | 6 | 3 | 329 |
| lbs/day | 2041.63 | 30.62 | | |
| Polynuclear Aromatic Hydrocarbons, mg/l | 100 | 10 | 0.170 | 27.14 |
| lbs/day | 120.00 | 51.04 | | |
| Biochemical Oxygen Demand, mg/l | 300 | 30 | 0.5 | 81.43 |
| lbs/day | 360.29 | 153.12 | | |
| Flow, gpm | 100 | 425 | 1500 | 525 |
| MGD | 0.144 | 0.612 | | 0.756 |

(1) THE HIGHEST VALUE ON TABLE 8 IN "Soil and Ground Water Investigation" June, 1977, Prepared by the State of Minnesota, and authored by Barr Engineering Co.

(2) From page III-34 of report referenced in footnote #1, concentration after 60 minutes of pumping from MT. SIMON-HINCKLEY well on site.

(3) Report referenced in footnote #1 estimated 45 gpm, 135 gpm is an assumed safety factor

TABLE ~~10~~ 2

STANDARDS FOR DISCHARGES OF STORM WATER FROM SITE TO MINNEHAHA CREEK[a]

| Substance or Characteristic | Permissible Concentration With Dilution | Permissible Daily Maximum Concentration |
|---|---|---|
| Oil and Grease, mg/l | 0.5x[b] | 15 |
| Phenols, mg/l | 0.01x | 0.1 |
| 5-Day Biochemical Oxygen Demand, mg/l | 5x | 45 |
| Total Suspended Solids, mg/l | 5x | 45 |
| Total Chlorine Residual, mg/l | 0.01x | 0.2 |
| Zinc, mg/l | 0.12x | 1.0 |
| Cadmium, mg/l | 0.03x | 0.2 |
| Copper, mg/l | 0.01x | 0.5 |
| Nickel, mg/l | 0.52x | 2.0 |
| Lead, mg/l | 0.03x | 1.0 |
| Ammonia, mg/l as N | 1.0x | 2.0 |
| Benzo-α-pyrene, mg/l | -- | 0.00001 |
| Chrysene, mg/l | -- | 0.00001 |
| pH, units | -- | 6.5-8.5 |

[a]Source: NPDES Permit No. MN 0045489. Refer to permit for additional detail.

[b] $x = \frac{(0.25)(\text{flow in Minnehaha Creek})+(\text{effluent flow rate})}{(\text{effluent flow rate})}$

Flows used in calculation of dilution ratio "x" shall be the daily total effluent flow rate and the daily total flow rate for Minnehaha Creek.

# A P P E N D I X  F

## TREATABILITY OF COAL-TAR DERIVATIVES IN EFFLUENT FROM GRADIENT CONTROL WELLS

## APPENDIX F

## TREATABILITY OF COAL-TAR DERIVATIVES IN EFFLUENT FROM GRADIENT CONTROL WELLS

Due to regulatory constraints, the water quality parameters of most interest in the discharge from the ground water gradient control wells include phenolic substances, polynuclear aromatic hydrocarbons, chemical oxygen demand, and oil and grease. Concentrations of these organic parameters can be reduced by a variety of physical, chemical and biochemical processes which are described in the literature. In this appendix, some of these processes are briefly described. The results of laboratory tests undertaken to investigate the feasibility of several simple treatment operations are also presented.

### Physical Treatment

Gravity separation, the simplest form of physically removing oily material from water, is comparable to primary treatment of wastewater in conventional sewage treatment plants. This approach is often successful, especially where oily wastes are highly concentrated, and can result in removal of a variety of organic and oxygen-demanding substances and in recovering economically useful materials. However, it has been observed that hydrocarbon mixtures in effluent from the gradient control wells will not separate readily, either because of a highly emulsified condition or because of interaction with soluble organic material, such as phenols. Upon standing for periods in excess of 24 hours, a degree of separation did occur among samples from Well 13, with a heavier dark brown sludge settling below a tan to brown supernatant. However, the sludge fraction still contained a significant amount of water. Therefore, it is likely that gravity separation processes are not feasible for efficient removal of organic materials from the effluent. Thus, if physical treatment is to be useful, more sophisticated technology must be introduced. Flotation, filtration and coagulation processes have been successful in separating oil/water emulsions (Patterson, 1975; Reynolds and Shack, 1976).

Preliminary tests, which will be described in more detail in the discussion of chemical treatment, indicated that partial chemical oxidation and coagulation successfully broke the emulsions to produce a heavy sludge, leaving a reasonably clear supernatant. Other methods of physical treatment--such as volatilization, flotation, filtration and centrifugation--were not examined.

## Chemical Treatment

A variety of chemical oxidants and coagulants are available that will participate in chemical reactions to remove oily or emulsified organics from wastewater by oxidation and/or coagulation. Oxidants such as chlorine, hypochlorite, chlorine dioxide, ozone, and potassium permanganate have been used successfully in pilot and plant scale operations for the removal of phenolic and other organics (Armco et al., 1951; White, 1972; Patterson, 1975; Reynolds and Shack, 1976). Coagulants such as various polyelectrolytes, manganese dioxide, alum and lime can also break emulsions and enhance gravity separation.

Of the oxidants mentioned above, chlorine and hypochlorite are very commonly used because of their application to disinfection of drinking water and sewage. The literature indicates that oxidation of phenolics by chlorine occurs most readily in the pH range of 7 to 10 (Armco et al., 1951). When dosage and/or reaction time are insufficient for complete oxidation, partial chlorination using chlorine or hypochlorite has the danger of producing chlorophenols, which tend to increase taste and odor problems (Morris, 1975). There also is a general concern that chlorination of some hydrocarbons may result in a release of potentially harmful compounds in the effluent (Kelley, 1975; Morris, 1975).

Chlorinated hydrocarbon production can be minimized or avoided by use of other oxidants either in combination with or in place of chlorine and hypochlorite. Ozone, chlorine dioxide and potassium permanganate have been found to oxidize aromatic hydrocarbons without the production of undesirable products (Armco et al., 1951; Carus, 1971; White, 1972; Johnson, 1975). Of these, ozone has the disadvantage of requiring on-site generation with

expensive capital and operating costs. Oxidation by potassium permanganate will result in the formation of manganese dioxide, a coagulant, and the production of significant quantities of sludge.

Although some investigations have identified trace chlorinated aromatic compounds produced by oxidation of phenolics with chlorine dioxide (Lindgren and Ericsson, 1969), pilot and plant scale operations using chlorine dioxide have shown that partial or complete oxidation of phenolics and COD can be achieved without formation of significant chlorophenols. Control of phenolic tastes and odors has required dosages of 0.3 to 10 pounds of sodium chlorite per million gallons of wastewater (White, 1972). Sodium chlorite is oxidized by $Cl_2$ to generate $ClO_2$ in most operations. Experimental oxidation of coke plant wastes showed that use of chlorine dioxide in combination with chlorine gas improved efficiency of using chlorine dioxide alone. Substantial elimination of phenolics appeared to be achieved in a period of 5 minutes or less (Armco et al., 1951).

Literature information and theoretical half-reaction stages for oxidation of organic compounds by chlorine dioxide indicate that a drop in pH can be anticipated as a result of the use of chlorine dioxide. Experimental use of chlorine dioxide to remove phenolics from coke plant waste with phenolic concentrations in the range of 80 to 200 mg/l resulted in a drop of up to 9.8 pH units. It appears that creation of both organic and inorganic acids is likely responsible for this change. Of the inorganic acids that may be produced, some have low dissociation constants, indicating they are strong acids. For example, $HClO_3$ could be produced during oxidation with chlorine dioxide and has a dissociation constant greater than 1, indicating it is a very strong acid (Johnson, 1975). HOCl, which is produced during conventional chlorination, is a weak acid by comparison with a dissociation constant of $2.9 \times 10^{-8}$.

To indicate the degree to which chemical oxidants might be effective in removing organics from the effluent from the gradient control system, several preliminary tests were conducted using sodium hypochlorite and potassium permanganate as oxidizing agents. Chlorine dioxide supplies for limited laboratory experiments could not be located.

For the oxidation experiments, ground water from Well 13 was diluted by 50% and by 98% with deionized water in an attempt to produce concentrations likely to be representative of effluent from the gradient control wells. Diluted samples were then oxidized with sodium hypochlorite (NaOCl) and potassium permanganate ($KMnO_4$) at concentrations based on literature information (Reynolds and Shack, 1976; Carus, 1971). A one-hour contact time was used to guarantee relatively complete oxidation reactions. After oxidation, NaOCl-oxidized samples were analyzed for phenolics, COD and pH. In addition, the most heavily oxidized sample from each dilution was analyzed for suspended solids and oil and grease, and each sample in the 50% dilution series was analyzed for biochemical oxygen demand. One sample was oxidized with $KMnO_4$ for comparison with NaOCl. This sample was analyzed for phenolics.

The results of these experiments are summarized in Table F-1 and show that both sodium hypochlorite and potassium permanganate were capable of oxidizing the organics from the middle drift aquifer. Phenolic removals were 12% or less where NaOCl dosages were not significantly greater than the theoretical requirement for complete decomposition. This is in agreement with the findings of others (Reynolds and Shack, 1976). Phenolic removals improved significantly with increased NaOCl dosage. On the other hand, COD removal appears to improve slightly with oxidant concentrations and with dilution. Since COD analyses do not measure aromatic hydrocarbons, this may reflect COD generation by the cleavage of aromatic rings partially compensating for COD destruction by chlorination. Oxidation efficiency appears to have been significantly higher with potassium permanganate than with sodium hypochlorite. This may have occurred because of a more specific affinity of $KMnO_4$ for phenolics, because of reaction pH, or for some other reason.

An undesirable byproduct of oxidation is the formation of suspended solids, especially with $KMnO_4$. After oxidation, suspended solids concentrations were measured in the samples oxidized with the highest hypochlorite dosages and were found to have increased by a factor of about two or more. Solids production in the sample oxidized with $KMnO_4$ was much more dramatic, with formation of a heavy sludge which occupied about 10% of the volume after a settling period of about 1 hour. Visual inspection of the remaining

oxidized samples the next day revealed that quiescent settling had removed substantially all turbidity from the samples.

In conclusion, experiment data indicate that the organics under study are amenable to treatment by chemical oxidation in a manner that is consistent with experience reported by others. High dosage requirements and sludge generation must be assumed if this is the only method of treatment employed. These processes appear to be helpful in breaking emulsions and enhancing gravity clarification.

Biological Treatment

Biological oxidation of phenolics and other organic wastes have received a tremendous amount of attention over the years. Trickling filters, activated sludge, oxidation ponds and other applications have been used on experimental and plant scale to remove COD, phenolics and aromatic hydrocarbons. In most cases, removal of emulsified oils to about 100 mg/l is necessary prior to biological treatment (Reynolds and Shack, 1976). This could complicate the use of biological treatment for direct oxidation of organics in the undiluted effluent from the gradient control wells. Examination of microbial degradation of these materials has led to isolation of various common microbes that are capable of oxidizing specific organics (McKenna and Heath, 1976; Cobb, 1973) and to the suggestion that toxic metabolic byproducts may be responsible for failure of unacclimated microbes to degrade some organics (Baird et al., 1974). Patterson (1975) and Reynolds and Shack (1976) present brief reviews of applications of biological treatment to oxidation of phenolics and creosote wastes. Removals of phenolics and COD ranging from poor to substantially complete removal are reported.

Several aspects of biological treatment must be considered in the treatment of organic wastes. First, all biological systems are susceptible to upsets due to variations in influent quality and to seasonal factors. Changes in waste strength, microbial nutrient balance, toxic chemical concentrations, hydraulic loadings, sunlight and temperature may affect the efficiency of the process. The production of biological solids can result in the need for sludge handling, although extended aeration can be used to

reduce the volume of sludge. To maintain aerobic conditions, oxygen supply systems are often needed. Biological treatment will need regular attention by trained personnel to control and maintain the treatment efficiency.

To examine the effluent from the gradient control wells for biological treatability, several tests were made using various ground water samples. These tests are summarized in Table F-2. They were conducted to indicate the biochemical oxygen demand of the raw water and to indicate whether or not prior chemical oxidation would seriously affect biodegradation.

Variations in 5-day BOD of samples taken June 2, 1977 may reflect variations in organic species found among the different sources. Failure of BOD tests to yield results for most samples probably reflects a combination of dilution in the BOD bottles and toxic effects due to the complex nature of organics present in the ground water. As the data indicates, the 5-day BOD's of samples taken June 2 from Well 13 and Well 17 were about 2,000 mg/l and 30 mg/l, respectively.

Other BOD experiments were run with samples collected June 22, 1977 after 50% dilution with deionized water and oxidation with NaOCl. The 5-day BOD's of these samples were in the range of 2,000 to 3,000 mg/l, indicating that the 5-day BOD of the raw ground water obtained June 22 may have been in the range of 4,000 to 6,000 mg/l. This conclusion is supported by the fact that raw water COD was significantly higher on June 22 than on June 2. Reduction of toxic compounds due to chemical oxidation and variations in microbial seed or nutrient availability may also have been responsible for this change in BOD. While a sample of domestic sewage was used as the seed on June 2, water taken from the storm water pond south of Lake Street in the study area was used as the seed source in the second set of experiments, on the theory that these microbes might be better acclimated to metabolize phenolics and other aromatic hydrocarbons.

Data from the BOD tests of June 22 provide sufficient information to estimate BOD kinetic parameters for the oxidized ground water. Once initiated, microbial activity was vigorous and results indicated first order BOD reaction rate constants, K (base e), in the range of 0.6 to 1.2. The ultimate

carbonaceous BOD, L, was estimated to range from 2,500 mg/l to 3,200 mg/l. Both K and L may increase with better acclimated microbes or other factors. Values of both K and L were found to decrease somewhat with heavy applications of NaOCl during pretreatment, probably as a result of the chemical oxidation. Compared with "strong wastewater"--where K and L values of about 0.4 and 250 might be expected (Fair et al., 1968)--this indicates an extremely strong wastewater and very rapid microbial response. Based on this information, substantially complete removal of metabolizable BOD should take place within about 4 to 8 days.

These BOD analyses are consistent with the complexity of the organic chemicals present in the ground water, the variations in water quality parameters throughout the study area, the high concentrations of oxygen-demanding substances in various ground water samples and the difficulties inherent in analyses of biodegradation where unusual compounds and potential toxins are present. Results do indicate that these organics should be biodegradable, especially when acclimated microbes are available, and that pre-treatment by oxidation with hypochlorite does not seriously inhibit biodegradation. Additional testing would be necessary to define the biodegradability of these organics more accurately.

TABLE F-1

EFFECTS OF CHEMICAL OXIDANTS ON QUALITY OF GROUND WATER[a]

| Oxidant Dosage (mg/mg phenols) | Dilution Ratio[b] | Approximate Initial Phenols (mg/l)[c] | Final Phenols (mg/l) | Percent Removal | Approximate Initial COD (mg/l)[c] | Final COD (mg/l) | Percent Removal | Approximate Initial Suspended Solids (mg/l)[c] | Final Suspended Solids (mg/l) | Final pH[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.9 NaOCl | 1:2 | 25 | 22 | 12 | 20,100 | 11,300 | 44 | -- | -- | 8.0 |
| | 1:50 | 1.0 | 2.5[e] | None | 800 | 384 | 52 | -- | -- | 7.1 |
| 11.4 NaOCl | 1:2 | 25 | 7.5 | 70 | 20,100 | 11,000 | 45 | -- | -- | 8.5 |
| | 1:50 | 1.0 | 0.38 | 62 | 800 | 376 | 53 | -- | -- | 7.9 |
| 52.2 NaOCl | 1:2 | 25 | 2.2 | 91 | 20,100 | 10,500 | 48 | 240 | 463 | 9.1 |
| | 1:50 | 1.0 | 0.088 | 91 | 800 | 384 | 52 | 10 | 61 | 8.5 |
| 14 $KMnO_4$ | 1:2 | 25 | 3.0 | 88 | -- | -- | -- | -- | -- | -- |

[a]All samples reacted for 1 hour prior to chemical analyses.

[b]Raw water was diluted with deionized water. Raw water had 50 mg/l phenols, 40,200 mg/l COD, 486 mg/l suspended solids, and pH 7.5. Source of raw water was sample taken from Well 13.

[c]Initial concentrations estimated based on dilution factors.

[d]pH was primarily influenced by the pH of the concentrated oxidant (12.6). Little or no change was observed during reaction.

[e]Inconsistent data. Probably reflects uneven distribution of organics in raw water prior to dilution or an error in analysis. Raw water was shaken thoroughly before samples were withdrawn.

TABLE F-2

SUMMARY OF BIOCHEMICAL OXYGEN DEMAND DATA

A. 5-Day BOD of Samples Taken June 2, 1977

| | Volume of Sample in 303 ml BOD Bottle (ml)* | | | | | |
|---|---|---|---|---|---|---|
| Source | 0.03 | 0.5 | 1.0 | 3.0 | 10.0 | 30.0 |
| Well 5 | ND | ND | ND | ND | ND | ND |
| Well 6 | ND | ND | ND | ND | ND | ND |
| Well 9 | ND | ND | ND | ND | ND | ND |
| Well 13 | ND | 2,200 | 1,700 | ND | ND | ND |
| Well 17 | ND | ND | ND | ND | ND | 30 |

B. 5-Day BOD of Well 13 Samples Taken June 22, 1977 After 50% Dilution With Deionized Water and Chemical Oxidation With NaOCl

| NaOCl Dosage (mg/l) | Volume of Sample in 303 ml BOD Bottle (ml)* | | | |
|---|---|---|---|---|
| | 3.0 | 1.0 | 0.5 | 0.1 |
| 72 | >460 | >1,400 | >1,500 | 3,000 |
| 280 | >460 | >1,400 | >1,400 | 1,800 |
| 1,300 | >460 | >1,400 | >1,600 | 2,400 |

*Balance of bottle was filled with deionized water.

ND means "non detected."

ecology and environment, inc.
223 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60606, TEL. 312-663-9415
International Specialists in the Environmental Sciences

DATE: December 8, 1980

TO: File

FROM: Rod Bloese RTB

SUBJECT: Minnesota/TDD# F5-8012-3
St. Louis Park/Reilly Tar and Chemical Co.

On December 3, 1980, the author met with Melanie Toepler (USEPA - Region V Enforcement) to obtain background information concerning the subject site. Areas to be addressed in developing cost estimates for clean-up of groundwater and soil in the subject site area were discussed. Subsequently, background information was reviewed and the following scope of work was determined.

Cost estimates for the following areas will be determined:

1. Water treatment of all fifteen (15) St. Louis Park Municipal wells and a number of additional wells.

2. Remedial activity (clean-up) regarding on-site well #23.

3. Remedial activity regarding approximately fifteen (15) "multiaquifer" wells.

4. Contaminated soil treatment, clean-up, and/or disposal.

5. Well field management plan.

Presently, background review is continuing and cost estimate work for the above five (5) areas are being initiated.

RB/df

recycled paper

ecology and environment, inc.
International Specialists in the Environmental Sciences

Technical Brief

Number 11

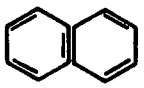
3 October 1980

# ANALYSIS OF POLYNUCLEAR AROMATIC HYDROCARBONS

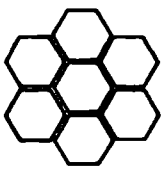
The Analytical Services Center of Ecology and Environment, Inc., performs analyses to determine the presence and extent of polynuclear aromatic hydrocarbons in air, water, soil, sediment, and particulate matter.

---

Polynuclear aromatic hydrocarbons--also called polycyclic aromatic hydrocarbons, PNAs, or PAHs--comprise a large class of organic compounds containing carbon and hydrogen combined in two or more condensed (joined) rings. The lowest member of this class is naphthalene (moth balls):



One of the highest members is coronene:



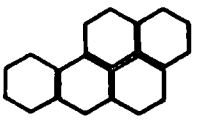
In nature, these ring structures are found in a number of products including coffee, clove stems, eucalyptus oil, and in smoke from open burning such as forest fires.

These compounds also occur in such diverse sources as fossil fuel combustion products, motor vehicle exhaust, fumes from coke ovens, refuse incineration, and cigarette smoke. Recently about 1,000 different PAHs were identified in cigarette smoke.

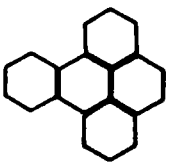
Since PAHS occur so often and because many are known carcinogens or cocarcinogens, there is now justifiable concern regarding their measurement and control. The PAH dibenz [a,h]-anthracene was, in fact, the first chemical substance of known structure to be identified as a carcinogen almost 50 years ago. The relative carcinogenic potency of PAHs as a class is second only to alfatoxins, yet the variation of PAH molecular structure can profoundly influence carcinogenic activity which ranges from inactive (e.g., anthracene), through borderline (e.g., benz[a] anthracene), to highly carcinogenic (e.g. BP, 7, 12 dimethyl benz [a]anthracene). The study of PAHs is further complicated by the fact that significant differences in biological activity are seen in structurally related compounds.

A good example of this difference is provided by comparing the structures of benzo [a] pyrene (B[a]P) and benzo [e] pyrene (B[e]P).

Benzo [a] pyrene
B[a]P



Benzo [e] pyrene
B[e]P



Although both are widely distributed throughout the environment, only B[a]P is of marked environmental concern, owing to its much greater carcinogenicity. Analytically, these two compounds are very difficult to separate and identify.

Concern for the deposition of PAHs in

the environment is further increased by recent discoveries that PAHs in the atmosphere are concentrated on the surface of particulate matter. Additionally, it has been determined that most of the mass of PAH is associated with aerosol in the respirable size range.

Consequently, new technologies, especially those involving combustion, must be looked at closely in regard to possible PAH generation.

Identification and determination of PAH components in complex organic mixtures found in industrial emissions or environmental samples is a challenging task owing to the complexity of the components present even in relatively simple samples. Early methods of PAH analysis concentrated on the measurement of only one PAH, benzo [a] pyrene, as an indicator of PAH contamination. Recent advances in chromatography have allowed investigators to gain further insight into the nature and extent of PAH contamination. The advent of computerized Gas Chromatography/Mass Spectrometry (GC/MS) has been instrumental in the identification of many new PAHs in the environment.

E & E's Analytical Service Center utilizes its GC/MS system to identify and quantify PAHs in environmental samples. Its Hewlett Packard 5993 GC/MS can accept capiliary columns, greatly enhancing its ability to separate complex PAH mixtures. E & E's ASC can perform PAH analysis on air, water, soil, sediment, and in particulate matter collected from mobile and stationary sources.

Figures 1, 2, and 3 are read-outs from E & E's GC/MS system, showing the processes whereby several PAHs were identified in an air and a sediment sample. Figure 1 gives the results of the analysis of the standard used to compare against sample results. Figure 2 shows the analysis of an air sample collected on highvol filters at a hazardous dump site in Pennsylvania. Figure 3 is the analysis of a sediment sample collected in the Buffalo River at the point where it enters Lake Erie.

Naphthalene, fluorene, anthracene pyrene, and fluoranthene were found in the air sample. These same compounds plus chaysene and benzo(K)-fluoranthene were detected in the Buffalo River sediment.

# ANALYSIS OF POLYNUCLEAR AROMATIC HYDROCARBONS
(Cont.)

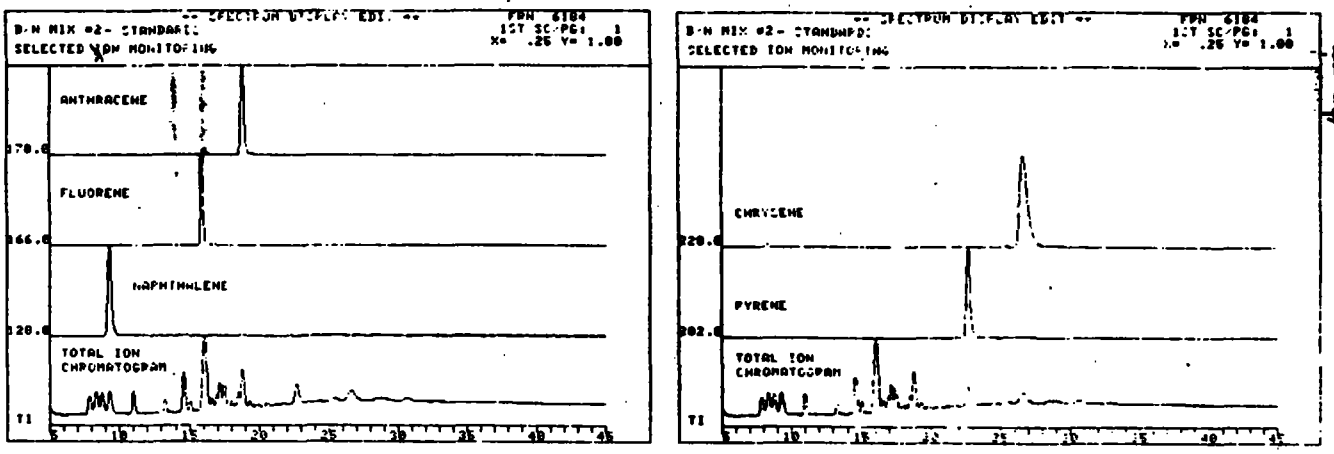



**Figure 1 GC/MS STANDARDS**

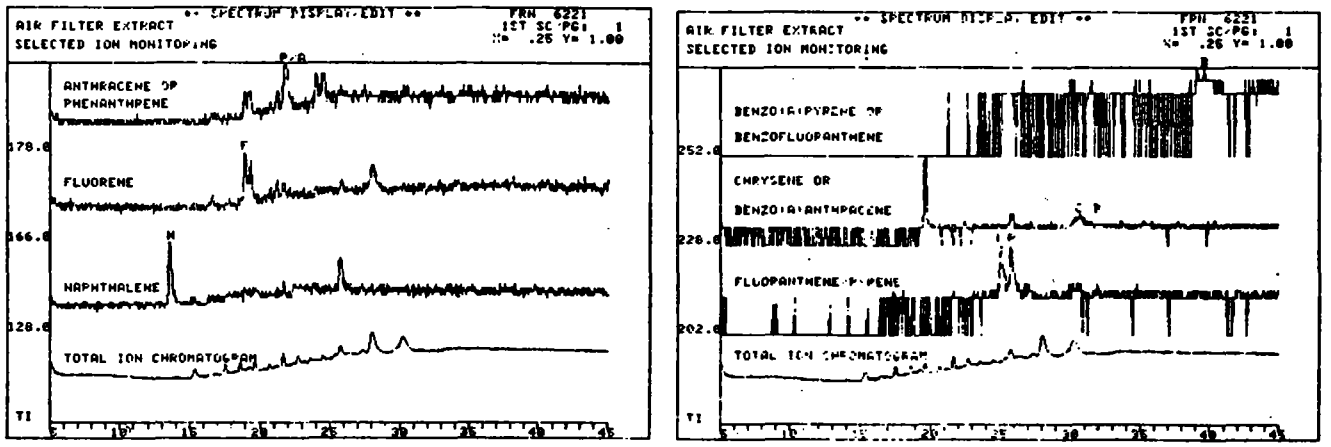



**Figure 2 GC/MS ANALYSIS OF AN AIR SAMPLE**

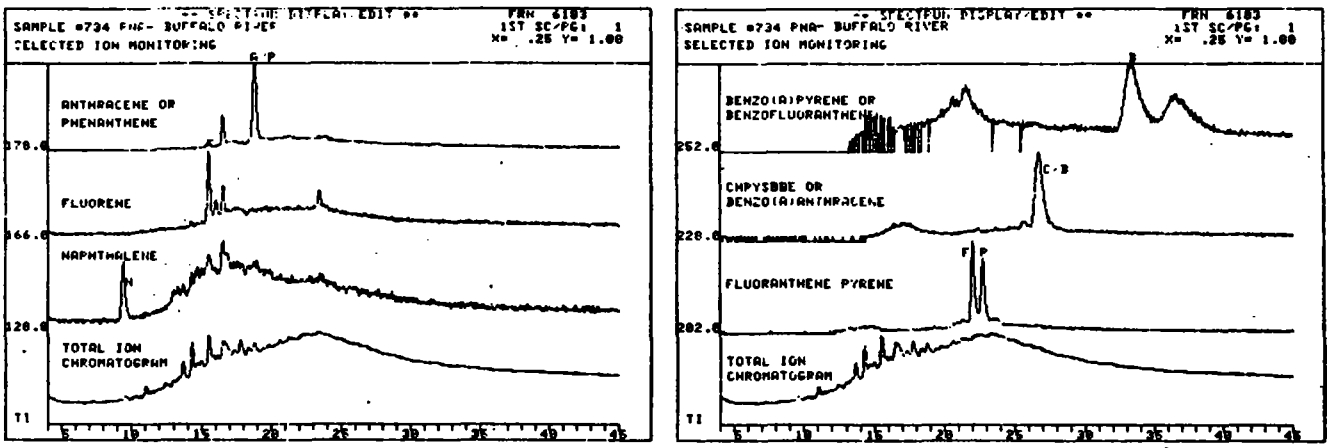



**Figure 3 GC/MS ANALYSIS OF A SEDIMENT SAMPLE**

1-21-85
Meeting w/ Crane Winton

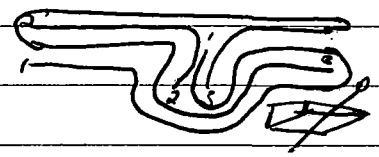
Issue: Should R. Tar be precluded from bringing in other witnesses
- Non compliance w/ ¶6 + also Magnuson's interest in minimizing # of witnesses
- C. Winton's tendency is to not limit the # of witnesses prior to trial (unless an order says otherwise) If the W
- Coyne: case mgt order ¶5 identifies retained + experts; ¶6 others + then ¶13 + then ¶22 for extensions ∴ the issue is whether
  - R. Tar
- Hird: wants R. Tar to go w/ Andelman + Santodonato
- ES: Spitzer + Shindell reports can't be done until they get the state eppi data

Shakman: 1) Dusich 1979 +50%
2) Dr. Dean 12/80 or later
3) 1984 Legis ⇒ feas. study 1/86
- questionnaires are clearly covered by state conf law 144.053

Winton: ES must submit outstanding reports; summaries are OK
- ES says no more from Shindell
- Spitzer → ES says may or may not use him
- Smith + Havender are doing a risk assessment ⇒ ES will figure out when we can get a report

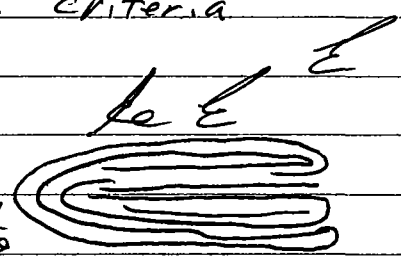
- Pohl: ES gave us a photocopy of 2 of Pohl's reports; Winton said ES is limited to what's in the report ∴ its OK
- Cottell: AWPA reports ⇒ give specific reference as to what he will rely on, otherwise it's unfair

Deposition Schedule:
- begin week of 2/4/85; ES has a vacation that he wanted to take



Sierks: we need Monsato's master index for the data
- interpretations of chromatographs ⇒ ES says OK

ES said RT doesn't dispute the ERT report but disagrees w/ the 28ppt criteria
CW says its illogical.




We will draft an order to incorporate what was agreed upon here.

DH: 11/84 amendments → complaint

- served by mail as of Monday is OK

June 24

# Reilly Tar Strategy Session

OWPE Hansel
Remedy: drinking water to SLP
clean up aquifers consistent w/ their use
eliminate discreet sources of contaminants
- W-23 ; W-13
eliminate multi-aquifer wells + other pathways
- W-23 gross contaminants have been removed
- CH2M-Hill phase one is done in 2wks

Bitter
objectives: water
health risks in other aquifers
soil

-
- ERT uses S.S. Maine + Oregon wh have high b. ground levels of PAH

(1) Action level for PAH (non-carcinogenic)

- heterocyclic are "ring substituted"
- Ames salmonella
- (minus) → ~~[illegible]~~ predictly have been tested
Selkirk: very good, + slick report + accurate

400,000 ppt = 400µg ?

4000 ppt is ERT's action level

~~Port Dover, Oregon~~

Selkink says Santodonto is wrong w/his bay region theory because it doesn't
eg. B(a)p + B(e)p
- it's a good screen predictor or as a basis for

The big argument:
~~+ co-carg can~~
- co-carcinogenic
- no greater risk for SLP I

Jean, ~~Jo~~ Parker: Ames + mammalian cell testing

Selkink ① thinks that the Ames + mammalian cell testing of the munic. d.w. wells is a mistake because it could backfire

NIOSH study is good to get

② look for proven co-carcinogens among the "non-carcinogens"

③ also, these "non-carcinogens" are similar in structure + are metabolized similarly to the carcinogen + ∴ evoke a similar response ~~to~~ from the liver ~~in order to metabol~~, i.e. the release of enzymes which are the same ones which activate carcinogenic chemicals, such as Benza(a)pyrene, which affect the cells DNA/RNA

7 7/8 % over 20 yrs (const. grant program method)
e.r. of r. = effective rate of return
- they used Reilly's formulas + $CH_2M$-Hill's $
- RT is 2nd column
- $CH_2M$-Hill = 3rd column
- capital + O + M costs are $CH_2M$-Hill's
- R.T said 5%
- e r of r = (interest − inflation)

Hansel
RT = $2-5 million costs
MPCA = ~~$5-8 million~~ macronucleus
$8-12 million n.c. cystochrome exchange

Sampling + Analysis
1. Ames test of W-23
2. Kimble's analyses to get the data
to begin in August + it will take him 8 mos
PDC — W-23; W-15, control, W-300
Drift — W-13, W 107 + one in between (+ one control)

3 dirty + clean peat
- GCA took samples
- clean peat was clean + dirty peat was dirty

July 11 is the next meeting

Hansel: W-13 should be pumped to get rid of hydrocarbon layer

1. Boyt surface area: cover + deed restrictions
   maybe one gc well in drift aquifer
   - W-13 pump out
   - W-23, old Millwaukee Rd well (done) & drinking water well
2. Kimble samples
   W-23, 13 + 2 controls collect
   23, 300, 115, control, 13, X, Y + another control

3. Epi study:
   KOS thought that the lawyers had OK'd it quite a while ago
   Shakman said state wants to get technical input if its done but the state doesn't care particularly whether it's done
   Burgman thinks that it would hurt the litigation because it would be inconclusive; Selikoff agrees that it would hurt our case; population sample is too small; other reasons for increased mortality
   They agree that it would be nice to do it after the trial

   KOS said its use as rebuttal for the case is 2°
   So the real reason we is that we have other PAH SF sites in the country

- 6/24/83 PAH CRITERIA MEETING -
FOR DRINKING WATER

| | | |
|---|---|---|
| BOB LEININGER | U.S. EPA, REGION V | 312-886-6720 |
| Mike Hansel | MN PCA | 612-296-7758 |
| Mike Harris | CH2M HILL | 414-272-2426 |
| RUSS DIEFENBACH | U.S.E.P.A. | 312-886-6336 |
| Jean C Parker | OWPE/US EPA | 202-382-4833 |
| PAUL ZERBY | MINN-AG (Health) | 612-341-7272 |
| Steve Shakman | " " (PCA) | 612-296-7342 |
| so coming) David Gray | MINN DEPT OF HEALTH | 612-~~296~~ 623-5352 |
| DEBORAH WOITTE | U.S. EPA, Wash. D.C. | 202-382-3117 |
| Ed Kleppinger | Consultant ★ Minn A.G. | 202-488-1015 |
| MIKE KOSAKOWSKI | U.S. EPA Wash D.C. | 202 382 4811 |
| Eula Bingham | Univ. Cincinnati, Cin to 45208 | 513-475-4532 |
| Brenda Kimble | Amphion Associates, CA | 415-372-8260 |
| David Hird | US Dept of Justice | 202-633-2771 |
| PAUL BITTER | U S EPA | 312 886-3007 |
| Jim Selkirk | OAK RIDGE | 615-483-1812 |

PARMETER
(ALL VALUES IN ug/l)

Table 5-1
ANALYSIS OF SURROUNDING WATER SUPPLIES
(Samples taken 11/16/82)
Note: All compounds found at less than detection limit have been deleted

| | St. Paul Influent | St. Paul Effluent | St. Paul Tap | Plymouth Influent | Plymouth Effluent | Plymouth Effluent | Plymouth Tap 1 | MPLS Influent | MPLS Effluent | MPLS Tap |
|---|---|---|---|---|---|---|---|---|---|---|
| ANALYSIS BY: | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL |
| ANALYTICAL EQUIPMENT: | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS |
| PAH (*INDICATES CARCINOGENIC PAH) | | | | | | | | | | |
| NAPHTHALENE | 16 | 13 | 29 | 7.8 | 5.9 | 5.3 | 9.4 | Note 1 | 9.1 | Note 1 |
| 1-METHYLNAPHTHALENE | | 5.1 | 12 | 1.2 | 1.2 | 1.2 | 6.0 | | 3.8 | |
| 2-METHYLNAPHTHALENE | | 7.4 | 17 | 5.3 | 5.0 | 4.3 | 11 | | 5.4 | |
| ACENAPHTHYLENE | | | 9.0 | | | | | | | |
| ACENAPHTHENE | | | 5.3 | | | | | | | |
| FLUORENE | | | 19 | | | | 9.9 | | | |
| ANTHRACENE | | | 12 | | | | | | | |
| PHENANTHRENE | 5 | 1.0 | 220 | | 1.0 | 1.0 | 37 | | 2.7 | |
| PYRENE | | | 64 | | | | 2.7 | | | |
| FLUORANTHENE | | | 140 | | | | 4.3 | | | |
| PHENYLNAPHTHALENE | | | | | | | | | | |
| 1,2,6,7-TETRAHYDROPYRENE | | | | | | | | | | |
| BENZO(a)ANTHRACENE* | | | 6.0 | | | | | | | |
| 9,10-BENZPHENANTHRENE | | | | | | | | | | |
| CHRYSENE* | | | | | | | | | | |
| BENZO(b&k)FLUORANTHENE* | | | 9.4 | | | | | | | |
| BENZO(a)PYRENE* | | | | | | | | | | |
| BENZO(e)PYRENE | | | | | | | | | | |
| BENZO(j)FLUORANTHENE* | | | | | | | | | | |
| PERYLENE | | | | | | | | | | |
| BENZO(g,h,i)PERYLENE | | | | | | | | | | |
| INDENO(1,2,3-cd)PYRENE* | | | | | | | | | | |
| O-PHENYLENEPYRENE | | | | | | | | | | |
| DIBENZO(a,h)ANTHRACENE* | | | | | | | | | | |
| TOTAL CARCINOGENIC PAH'S | -- | -- | 15.4 | -- | -- | -- | -- | | -- | |
| TOTAL "OTHER" PAH'S | 21 | 26.5 | 527 | 14.3 | 13.1 | 11.8 | 80.3 | | 21 | |
| NITROGEN HETEROCYCLES | | | | | | | | | | |
| ACRIDINE | | | | | | | | | | |
| CARBAZOLE | | | 28 | | | | 8.6 | | | |
| INDOLE | | | | | | | 5.9 | | | |
| PHENANTHRIDINE | | | | | | | | | | |
| QUINOLINE | | 4.7 | 5.1 | | 1.0 | 1.0 | 1.4 | | 2.6 | |
| SULFUR HETEROCYCLES | | | | | | | | | | |
| BENZO(b)THIOPHENE | | | 1.0 | | | | | | | |
| DIBENZOTHIOPHENE | | | | | | | | | | |
| OXYGEN HETEROCYCLES | | | | | | | | | | |
| DIBENZOFURAN | | | 23 | | | | 7.3 | | | |
| MISCELLANEOUS | | | | | | | | | | |
| BIPHENYL | | | 4.0 | | | | 10 | | | |
| 2,3-DIHYDROINDENE | | | | 3.2 | | | | | | |
| INDENE | | | | | | | | | | |
| 2,3-DIHYDRO-1-INDENE | | 1.4 | 1.4 | | 1.4 | 1.4 | 1.4 | | 1.4 | |
| 1H-INDENE | | | 1.0 | 2.2 | 1.0 | 1.0 | 1.0 | | 2.4 | |
| TOTAL OTHER BASE NEUTRAL COMPOUNDS | | | | | | | | | | |
| AROMATIC AMINES | | | | | | | | | | |
| ANILINE | | | | | | | | | | |
| 1-AMINONAPHTHALENE | | | | | | | | | | |
| 2-AMINOBIPHENYL | | | | | | | | | | |

NOTE 1: Contraction of a yellow substance caused inordinately high detection limits in these samples.

PARMETER
(ALL VALUES IN ng/l)

Table 5-2
ANALYSIS OF SURROUNDING WATER SUPPLIES
(Samples taken 1/20/83)

| | ST. PAUL Effluent | ST. PAUL Tap 1 | ST. PAUL Tap 2 | SLP-8 | SLP-8 | SLP Tap 1 | MPLS Effluent | MPLS Tap 1 |
|---|---|---|---|---|---|---|---|---|
| ANALYSIS BY: | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL | CH2M HILL |
| ANALYTICAL EQUIPMENT | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS | GC/MS |
| PAH (*INDICATES CARCINOGENIC PAH) | | | | | | | | |
| NAPHTHALENE | 13 | 45 | 21 | 7.0 | 7.0 | 5.6 | 8.8 | 20 |
| 1-METHYLNAPHTHALENE | 4.9 | 26 | 6.7 | 2.9 | 2.9 | 2.5 | 2.9 | 4.6 |
| 2-METHYLNAPHTHALENE | 8 | 58 | 12 | 5.9 | 5.9 | 5.2 | 4.7 | 9.3 |
| ACENAPHTHYLENE | | | | | | | | |
| ACENAPHTHENE | | 1.0 | 1.3 | | | 2.6 | | 1.3 |
| FLUORENE | | 1.4 | 6.3 | | | 4.4 | | |
| ANTHRACENE | | | | | | | | |
| PHENANTHRENE | 2.3 | 25 | 95 | 1.0 | 1.0 | 9.3 | 1.0 | 1.0 |
| PYRENE | 1.0 | 3.0 | 12 | | | 1.0 | | |
| FLUORANTHENE | 1.0 | 9.3 | 43 | | | 2.5 | | 1.0 |
| PHENYLNAPHTHALENE | | | | | | | | |
| 1,2,6,7-TETRAHYDROPYRENE | | | | | | | | |
| BENZO(a)ANTHRACENE* | 1.0 | | | | | | | |
| 9,10-BENZPHENANTHRENE | | | | | | | | |
| CHRYSENE* | 2.3 | 1.0 | 3.0 | | | | | |
| BENZO(b&k)FLUORANTHENE* | | | | | | | | |
| BENZO(a)PYRENE* | | | | | | | | |
| BENZO(e)PYRENE | | | | | | | | |
| BENZO(j)FLUORANTHENE* | | | | | | | | |
| PERYLENE | | | | | | | | |
| BENZO(g,h,i)PERYLENE | | | | | | | | |
| INDENO(1,2,3-cd)PYRENE* | | | | | | | | |
| O-PHENYLENEPYRENE | | | | | | | | |
| DIBENZO(a,h)ANTHRACENE* | | | | | | | | |
| TOTAL CARCINOGENIC PAH'S | 3.3 | 1.0 | 3.0 | -- | -- | -- | -- | -- |
| TOTAL "OTHER" PAH'S | 30.2 | 168.7 | 197.3 | 16.8 | 16.8 | 33.1 | 17.4 | 37.2 |
| NITROGEN HETEROCYCLES | | | | | | | | |
| ACRIDINE | | | | | | | | |
| CARBAZOLE | | 1.1 | 5.0 | | | | | |
| INDOLE | | | | | | | | |
| PHENANTHRIDINE | | | | | | | | |
| QUINOLINE | 8.2 | 6.6 | 9.0 | | 1.0 | 1.0 | 2.4 | 3.8 |
| SULFUR HETEROCYCLES | | | | | | | | |
| BENZO(b)THIOPHENE | | 2.0 | 1.0 | | | 1.0 | | 1.0 |
| DIBENZOTHIOPHENE | | | | | | | | |
| OXYGEN HETEROCYCLES | | | | | | | | |
| DIBENZOFURAN | | 2.0 | 6.9 | | | 2.0 | | |
| MISCELLANEOUS | | | | | | | | |
| BIPHENYL | | 2.2 | 1.0 | | | 2.6 | | 1.0 |
| 2,3-DIHYDROINDENE | 3.5 | 19 | 4.2 | 1.4 | 1.4 | 4.9 | 4.1 | 4.1 |
| INDENE | 1.0 | 2.3 | 1.0 | 1.0 | 1.0 | 2.3 | 1.0 | 1.0 |
| TOTAL OTHER BASE NEUTRAL COMPOUNDS | | | | | | | | |
| AROMATIC AMINES | | | | | | | | |
| ANILINE | | | | | | | | |
| 1-AMINONAPHTHALENE | | | | | | | | |
| 1-AMINOBIPHENYL | | | | | | | | |

NOTE: All compounds found at less than detection limit have been deleted.

values for

GLT207/70

Table VII

PAHs in Raw and Finished Waters in the United States[a] (ng/l)

| Compound | Cincinnati OH Raw | Cincinnati OH Fin | New Orleans LA Distributed | Miami FL Raw | Miami FL Fin | Seattle WA Raw | Seattle WA Fin | Portland OR Raw | Columbus OH Fin | Cape Girardeau MO Raw | Cape Girardeau MO Fin | Wheeling WV Raw | Wheeling WV Fin | Jefferson Parish LA Raw | Jefferson Parish LA Fin | Tucson AZ Raw |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph | 14 | 10 | 14 | 6 | 14 | 10 | 12 | 8 | 3 | 14 | 5 | 9 | 4 | 20 | 14 | 10 |
| Fl | <7 | <3 | <5 | <4 | <4 | <4 | <8 | 4 | 1 | 11 | 1 | 15 | 4 | 25 | 7 | <2 |
| Pyr | <14 | <4 | <3 | <4 | <6 | <4 | <6 | 6 | <1 | 9 | <1 | 15 | 2 | 18 | 3 | <2 |
| 1-MP | <6 | <4 | b | <2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 5 | <1 | 5 | <2 | <2 |
| An | b | b | b | b | b | b | b | b | b | 1 | <1 | b | <1 | 2 | <2 | <2 |
| Ch | 4 | <1 | <1 | <1 | 2 | <1 | 2 | <1 | <1 | 5 | <1 | 8 | <1 | 8 | <2 | <2 |
| B(a)A | 4 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 9 | <1 | 9 | <2 | <2 |
| Per | b | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | b | <1 | <4 | <1 | 7 | b | b |
| B(e)P | b | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | b | <1 | b | <1 | <14 | <2 | <2 |
| B(a)P | 9 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 13 | <1 | 12 | <2 | <2 |
| B(ghi)P | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 9 | <1 | 7 | b | b |
| B(b)F | 5 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 16 | <1 | 9 | <2 | <2 |
| B(k)F | 3 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | 7 | <1 | 3 | <2 | <2 |
| DiB(ah)A | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <2 | <2 | <2 |
| IP | <4 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <3 | <1 | <12 | <1 | <9 | <2 | <2 |
| Total | 39 | 10 | 14 | 6 | 16 | 10 | 14 | 18 | 4 | 58 | 6 | 107 | 10 | 125 | 24 | 10 |

a Sorrell, et.al., 1979.
b Not analyzed.

Table XVI

Concentration (ng/l) of PAHs in Finished and Distributed Waters[a]

| Compound | Standish, ME[b] Fin | Standish, ME[b] Dist[d] | Ludlow, MA[b] Fin | Ludlow, MA[b] Dist[d] | Columbus, OH[c] Fin | Columbus, OH[c] Dist[d,f] | Portland, OR[b,c] Raw | Portland, OR[b,c] Dist[e,g] | Seattle, WA[b] Fin | Seattle, WA[b] Dist[e] | Colorado Springs, CO[b] Fin | Colorado Springs, CO[b] Dist[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph | 5 | 57 | 2 | 3 | 3 | 17 | 8 | 3300 | 2 | 32 | 3 | 29 |
| Fl | 2 | 10 | 1 | 1 | 1 | 13 | 4 | 640 | 3 | 8 | 2 | 6 |
| Pyr | 1 | 5 | 1 | 1 | <1 | 8 | 6 | 340 | 2 | 2 | <1 | <1 |
| 1-MP | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| An | <1 | <1 | <1 | <1 | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Ch | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 6 | <1 | <1 | <1 | <1 |
| B(a)A | <1 | <1 | <1 | <1 | <1 | 3 | <1 | 2 | <1 | <1 | <1 | <1 |
| Per | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| B(e)P | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| B(a)P | <1 | <1 | <1 | <1 | <1 | -- | <1 | <1 | <1 | <1 | <1 | <1 |
| B(ghi)P | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 |
| B(b)F | <1 | <1 | <1 | <1 | <1 | 4 | <1 | 3 | <1 | <1 | <1 | <1 |
| B(k)F | <1 | <1 | <1 | <1 | <1 | 3 | <1 | <1 | <1 | <1 | <1 | <1 |
| DiB(ah)A | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| IP | <1 | <1 | 1 | 1 | <1 | <4 | <1 | <1 | <1 | <1 | <1 | <1 |
| Total | 8 | 72 | 5 | 6 | 4 | 54 | 18 | 4300 | 7 | 42 | 5 | 35 |

a < Indicates that the compound may or may not have been present at less than this concentration
b Zoldak, 1978
c Sorrell, et al., 1979
d Asphalt lining
e Coal tar lining
f Sediment present in water sample
g Taken at the end of a low demand 24" transmission line

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# WHO GUIDELINES FOR DRINKING-WATER QUALITY

H. Galal Gorchev and G. Ozolins
Division of Environmental Health
World Health Organization

A paper presented at the International Water Supply Association Congress, 6-10 September 1982, Zurich, Switzerland

## 1. INTRODUCTION

The last edition of the WHO International Standards for Drinking Water[1] was issued in 1971 and that of the European Standards[2] in 1970. These Standards have now been reviewed, revised and combined and will be issued in 1982/83 under the title of the WHO Guidelines for Drinking Water Quality.

The old Standards have been widely used and applied by Member States. The WHO International Standards for Drinking Water have been among one of the most widely recognized and utilized WHO publications. The recommendations contained therein have been adopted in their entirety in a number of Member States while in others they have been used as the basis for establishing national standards.

There is a substantial difference between the old Standards and the new Guidelines. The new Guidelines cover more substances, primarily chemicals, than the old Standards did and there have been a few changes in the recommended levels between the two editions; but perhaps the greatest change is with respect to (1) the basic philosophy in their intended interpretation, application and use, (2) their presentation and reporting, and (3) the manner in which the Standards were arrived at back in 1971 as compared to the way the new Guidelines were developed. The purpose of this paper is not to describe in detail the Guidelines for Drinking Water Quality and the guideline values which WHO will be recommending (although a table of these is included as Annex I), but rather to highlight the basic differences between the old Standards and the new Guidelines and to briefly comment on some of the scientific issues which were faced in the preparation of the Guidelines.

## 2. APPLICATION AND INTERPRETATION

Possibly the best illustration of the change which has taken place in the basic approach used is the change in the title of the document itself, i.e. from "Standards" to "Guidelines". This change is intended to reflect more accurately the advisory nature of WHO recommendations so as not to confuse these with legal standards which are the responsibility of the appropriate authorities in Member States. In contrast to the old Standards, the Guidelines clearly

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[1] World Health Organization (1971) International Standards for Drinking Water, 3rd ed., Geneva, WHO.

[2] World Health Organization (1970) European Standards for Drinking Water, 2nd ed., Geneva, WHO.

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recognize the desirability of adopting a risk-benefit approach (qualitative or quantitative) to national standards and regulations. The establishment of drinking-water quality standards must follow a very careful process in which the health risk is considered alongside other factors such as technological and economic feasibilities. The establishment of standards without considering the practical measures which will need to be taken with respect to either finding new sources of water supply, instituting certain types of treatment, and in providing for adequate surveillance and enforcement, will not yield the desired results. In the Guidelines the need for careful consideration of the standard setting process including follow-up activities are very much emphasized.

With respect to the above, the old Standards were rather inflexible, although some consideration was given to the difficulties which might be faced with respect to meeting the standards in areas with water resources which were inadequate in volume or quality. In the years since the last edition of the Standards was published, literally hundreds of comments have been received concerning the standards, with many of them citing the difficulties they had encountered in applying them.

It goes without saying that the possibilities for providing safe water differs greatly among the different areas of the world. There are differences between the areas of plentiful water and areas of water scarcity. There are differences with respect to ability to provide for treatment technology between the developed countries and the developing countries. There are differences between the water supplies for large metropolitan areas and those for villages and rural areas. Each case will require separate considerations if the resulting strategies, including the enactment of standards, are to be meaningful and achievable.

In the development of the Guidelines a debate took place as to whether or not WHO should prescribe different levels of water quality for different areas or for different types of water distribution systems. There were those that argued for a two-tiered or perhaps even a three-tiered approach whereby minimal guidelines would be proposed for those areas which could not, either for technological or for economic reasons, meet the more desirable or safer levels which would be recommended for application elsewhere. It was realized, however, that the WHO Guidelines are concerned with establishing the health basis and the health risk and as such they should provide a common basis for setting individual standards. For this reason it was decided that only one degree of water purity could be recommended by WHO, while at the same time recognizing that in certain areas it would take a longer time to attain them which might include the adoption of some more inferior interim standards, but where the ultimate aim would be to attain at least the levels which have been recommended in the new Guidelines.

The emphasis of the Guidelines is placed first and foremost on the microbiological safety of drinking water supplies. More than half of the world's population is still exposed to waters that are not free from pathogenic organisms, resulting in infectious diseases that ultimately lead to increased mortality rates in the population. Those at greatest risk to water-borne diseases are infants and young children who have not yet developed a natural immunity, those people who are debilitated and the aged. For these, infective doses are often significantly lower than those required for infecting the major segment of the adult population. It is quite clear that in those areas of the world, programmes for assuring the chemical safety or the organoleptic qualities of drinking waters will be delayed except in those cases where it is quite evident that industrial effluents or agricultural run-offs are seriously endangering the water supply.

The new Guidelines while stressing the importance of monitoring and surveillance, clearly recognize their limitations, particularly for the small water supplies. For these in particular, it is emphasized that routine sanitary surveys and other protective steps are useful and often the only practical means for identifying existing or potential contamination problems and for instituting remedial measures.

## 3. FORM OF PRESENTATION

In contrast to the 1970/71 WHO International and European Standards, both of which were issued as single volume documents, the new WHO Guidelines are being published in three volumes. Each of these is intended to serve a different purpose and to a certain extent they are also directed towards different audiences. Volume I will present the recommended guideline values per se (as shown in Annex I), together with essential information required to understand the basis for the recommended guideline values as well as information on monitoring requirements and where possible suggestions regarding remedial measures. This volume is primarily intended for those who are engaged in the standard setting process, as well as those that are responsible for the provision of safe drinking water. For each of the recommended guideline values, the toxicological and epidemiological basis for choosing a given value, and the health risk involved, are summarized including information on uncertainties, safety factors, multimedia routes of exposure, etc. Special attention is also given to the ways and means in which these guideline values are to be applied and used.

The second volume, which will contain some 400 pages, is essentially an environmental health criteria document covering those substances/contaminants which were examined with a view to recommending guideline values. This volume contains a review of the toxicological, epidemiological and clinical evidence which is available. This volume elaborates greatly on the health risk information presented in Volume I and should be considered as a vital companion document.

Volume III of these Guidelines is intended to serve a very different purpose. It will contain recommendations and information concerning what needs to be done in small communities and in rural areas with respect to safeguarding their water supply. While it will detail some methodology concerning sampling and analysis of water supplies, a much greater emphasis is being placed on sanitary surveys and similar means of investigating the possibilities of contamination, particularly due to the presence of pathogenic organisms. The sampling and analysis of water supplies are limited to the basic techniques of multiple tube and membrane filtration as concerns bacteriology and simple methods for residual chlorine determination. This third volume is intended primarily for those authorities and people at the community level whose responsibilities entail the protection of public health or who may work in areas of general sanitation, etc. This volume is to be produced in much greater number and in more languages than will be possible with the other two in the hopes that these Guidelines can reach and be used by the local authorities in as many developing countries as possible.

## 4. PREPARATION

The way the new Guidelines were prepared also differs greatly from the previous editions. The approach used in preparing the earlier editions was generally for a few experts or an institution to prepare a draft document which, after some external review, was then submitted to a WHO expert committee for the final review and determination of the standards which were to be issued.

The preparation of the new Guidelines took over three years and involved the active participation of nearly 30 Member States, literally hundreds of scientists and meetings of ten Task Groups. This effort was started in 1978 as a collaborative activity between WHO Headquarters and the WHO Regional Office for Europe. A planning meeting was convened in Copenhagen in 1978 where the basic plan for the development of the Guidelines was made. During 1979 the Danish International Development Agency (DANIDA) joined this effort by contributing funds to cover much of the costs involved.

Each of the major aspects of drinking water quality, i.e. microbiological, biological, chemical, organoleptic and radiological, was covered separately, in each case the relevant chapters being reviewed and finalized by a group of experts in the respective fields who made recommendations concerning the guideline values themselves. In the case of the chemical aspects, this was further divided into two sub-groups - one concerned with health-related

inorganics, with the other dealing with health-related organic constituents of drinking water. At various stages, the different sections of the document were reviewed by the national focal points for the WHO Environmental Health Criteria Programme which in many cases provided valuable input with regard to information available within their respective countries. The document was also reviewed by other international organizations and individual experts.

A final meeting to approve Volumes I and II of the Guidelines in their entirety, and in particular the recommended guideline values, was convened in Geneva in March 1982. It is expected that Volume I of the Guidelines will be issued prior to the end of 1982, with Volume II being issued during 1983.

Volume III, i.e. Guidelines for Drinking-Water Quality: Surveillance of Rural Community Supplies, is still under preparation and a meeting to review and finalize it is to be convened in Bangkok in December of this year.

## 5. GUIDELINE VALUES

The nature of the guideline values for drinking-water quality which WHO is recommending is to be interpreted along the following lines:

(a) A guideline value represents a concentration or a number which ensures an aesthetically pleasing water and does not result in any significant risk to the health of the consumer.

(b) The quality of water defined by the Guidelines for Drinking-Water Quality is such that it is suitable for human consumption and for all usual domestic purposes, including personal hygiene. However, water of a higher quality may be required for some special purposes such as renal dialysis.

(c) A guideline value is to be used as a signal: (i) to investigate the cause when values are exceeded with a view to taking remedial action; (ii) to consult with authorities responsible for public health for advice.

(d) The guideline values specified have been derived to safeguard health on the basis of lifelong consumption. Short-term exposures to higher levels of chemical constituents, such as might occur following an accidental spill, may be tolerated. The amount by which, and the duration for which, any guideline value can be exceeded without affecting public health depends on the specific substance involved.

(e) In developing national drinking-water standards based on the WHO Guidelines, it will be necessary to take account of a variety of local geographical, socioeconomic, dietary and industrial conditions. This may lead to national standards that differ appreciably from the guideline values.

In the following few sub-sections some of the basic technical issues involved with respect to the various aspects of water quality are highlighted. As mentioned before, the recommended guideline values are presented in Annex I. It is important to underline here that the guideline values by themselves are not a sufficient basis for their application or use - they must be taken into consideration along with the information contained in Volume I of the Guidelines and in some cases with respect to Volume II as well.

### Microbiological and biological quality

To ensure the absence of pathogenic bacteria and viruses, the new Guidelines recommend that for all types of water supplies, whether they be piped or unpiped, treated or untreated, or bottled water, faecal coliform indicator organisms should be absent. With respect to total coliform counts, some leeway is permitted ranging from absence of total coliforms in treated waters entering the distribution system of piped supplies, to a limit of an occasional 10 organisms in unpiped supplies.

Routine methods for detection of pathogenic protozoans and helminths in water supplies are not currently available and coliform organisms are not good indicators for the presence or absence of these biological contaminants. For these reasons, guideline values were not proposed for these biological organisms.

Chemical safety

Some 800 organic and inorganic chemicals have been found in drinking-water. It is of course not possible (because of lack of health effects data) nor practical to derive guideline values and subsequently standards for all of these. When selecting the chemicals for which guideline values were to be established, the following criteria were used:

(i) the chemical was known to occur relatively frequently in drinking-water in significant concentrations;

(ii) the chemical in question had been identified as being potentially hazardous to human health; and

(iii) the means for monitoring (analytical methods) were known to be available for monitoring and control purposes.

The Task Groups concerned with chemical safety of drinking-water investigated in depth 37 and 46 inorganic and organic chemicals respectively and it was decided that sufficient health effects information was available for 9 inorganic and 18 organic constituents for which guideline values are now recommended. Where applicable, guideline values were based on an assumed daily water consumption rate of 2 litres per person. It was also considered that the guideline values should be protective for exposure to the chemical in question over a lifetime. In all cases, the recommended guideline values were strictly designed to protect human health and thus may not be adequate for the protection of aquatic life.

For the majority of chemicals for which guideline values are recommended, the toxic effect in man was predicted from studies with laboratory animals. Considerable uncertainties are inherent in doing this which arise from the following factors:

(i) extrapolation of toxicological data from animal to man;

(ii) extrapolation from high to low dose range at which the shape of the dose/response curve is not experimentally verified:

(iii) lack of information about the intake of the chemical from water as compared to other routes of exposure, e.g. food and air.

For a number of the chemicals guideline values were derived from the no-adverse-effect dose in animals (or man where such data are available) and applying a safety factor in order to arrive at an acceptable level of exposure.

Guideline values recommended for a number of organic substances that are carcinogens or suspect carcinogens were based upon a linear multi-stage extrapolation model. These guideline values are based upon the selection of acceptable risk of less than one additional case of cancer per 100 000 population assuming again a 2-litre daily consumption of drinking-water by a 70 kg man.

In the case of pesticides, the guideline values were derived from the acceptable daily intake (ADI) value set by the FAO/WHO Joint Meeting on Pesticide Residues with the assumption that not more than 1% of the ADI is allowed through drinking water. Since the ADI is derived on the basis of lifetime exposure, short-term excursions above the value such as those resulting from vector or aquatic weed control operations may be acceptable but would require careful surveillance.

Based on most recent information it has been found necessary to alter certain of the existing international standards for drinking-water. For instance, recent data on lead have determined that children and infants are particularly susceptible to the effects of lead. The guideline value for lead has accordingly been lowered in order to take these groups into consideration.

Considerable new information has accumulated since 1971 on the health effects of synthetic organic chemicals in drinking-water. Accordingly, it was possible to develop guideline values for a series of individual pesticides, polynuclear aromatic hydrocarbons, chlorinated alkanes and alkenes, certain chlorophenols and chloroform. Where the available health effects information was considered not entirely satisfactory, "tentative" guideline values were recommended.

The International Programme on Chemical Safety (IPCS) will considerably influence future updating of the guideline values for chemical substances. IPCS is a cooperative venture of the International Labour Organisation (ILO), the United Nations Environment Programme (UNEP) and WHO, and has as two of its main objectives the evaluation of the effects of chemicals on human health and on the quality of the environment and the development of guidelines on exposure limits (such as acceptable daily intakes and maximum permissible or desirable levels in air, water, food and the working environment) for various classes of chemicals. Such an international assessment of human exposure to chemicals will be of considerable help in increasing the data base for any future revision of the Guidelines.

Aesthetic and organoleptic constituents and characteristics

In the case of characteristics based on human sensory evaluation, judgement is often subjective. Aesthetic/organoleptic characteristics are very much subject to social, economic and cultural considerations, and the establishment of standards for the aesthetic quality of drinking-water should take into consideration implementation possibilities, and the existing socioeconomic and environmental constraints. When resources are severely limited, establishment of priorities becomes even more crucially important and such priorities should be set in relation to their direct impact on health.

Radioactive materials

Guideline values for radioactivity in drinking-water are based on the most recent recommentations of the International Commission on Radiological Protection (ICRP). The guideline values recommended for gross alpha and beta activities apply both to naturally-occurring radioactivity and any radioactivity that may have reached the water sources as a result of man's activities. They represent a level below which water can be considered potable without more complex radiological examination.

## 6. IMPLEMENTATION

Safeguarding drinking-water supplies is a major health responsibility. The provision of safe drinking-water has been identified among the priority elements of primary health care which is the basis of the WHO strategy for health for all by the year 2000. That this element be vigorously pursued is the responsibility of many sectors of the governments of the Member States as well as of various professional disciplines. It should be considered of paramount importance not only by the ministries of health, but also by those who are charged with the management of water resources and the provision of water supplies for large cities as well as for small communities and villages.

It is the objective of providing safe drinking-water, with the emphasis on safe, that makes the guidelines an integral element of the International Drinking-Water Supply and Sanitation Decade. Thus the three volumes of the guidelines provide not only an important tool to secure safe supplies but also to set the yardstick for measuring progress and achievements towards the Decade goal.

Their application, however, has to take into account that water-related communicable diseases are rare in developed countries and there the chemical, aesthetic and organoleptic attributes may be of primary interest. Decade activities in countries still suffering from water-borne infections should find useful support from the microbiological and biological parts of the guidelines, and from the advice on their application. Volume III is specially intended to bridge the gap between the mere publication of guideline values and their actual compliance under often adverse conditions, technically and organizationally as well as in terms of the available manpower.

It is the hope of the Organization that the guidelines will be actively utilized by the governments at all levels to set new drinking-water quality standards where they do not yet exist or to up-date and expand existing ones. Standards embodied in the laws and regulations of a national or provincial authority do not automatically translate into improved water supply services and better health protection of the population. Vigorous assessment, monitoring and enforcement are the complementary actions the guidelines are now calling for.

The new guidelines provide a sound scientific basis (although with still some uncertainties) for establishing standards with respect to health protection. Thus, the law and policy makers are hopefully in a better position today to make the existing economic and technological feasibilities match the criteria when setting drinking-water quality standards.

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# ANNEX I

## SUMMARY TABLE OF GUIDELINE VALUES

Note: It is not the intention in presenting the tabular summary of guideline values that individual values should be used directly from the table. Guideline values must be used and interpreted in conjunction with the appropriate section and the information contained within the document.

Values recommended in these guidelines are for total concentrations (i.e. all forms of substances present).

### I. BACTERIOLOGICAL QUALITY

| Piped Supplies | Number per 100 ml |
|---|---|
| (i) Treated water entering the distribution system | Faecal coliforms 0<br>Coliform organisms 0 |
| (ii) Untreated water entering the distribution system | Faecal coliforms 0; 3 coliform organisms in any one sample, 0 in any two consecutive samples, 0 in 98% of yearly samples. |
| (iii) Water in the distribution system | Faecal coliforms 0;<br>3 coliform organisms in any one sample, 0 in any two consecutive samples, 0 in 95% of yearly samples. |
| Unpiped Supplies | Faecal coliforms 0<br>Coliform organisms 10 |
| Bottled drinking water | Faecal coliforms 0<br>Coliform organisms 0 |
| Emergency supplies of drinking water | Faecal coliforms 0<br>Coliform organisms 0 |

### II. INORGANIC CONSTITUENTS OF HEALTH SIGNIFICANCE

| | mg/l |
|---|---|
| Arsenic | 0.05 |
| Cadmium | 0.005 |
| Chromium | 0.05 |
| Cyanide | 0.1 |
| Fluoride | 1.5 |
| Lead | 0.05 |
| Mercury | 0.001 |
| Nitrate (as N) | 10 |
| Selenium | 0.01 |

| III. ORGANIC CONSTITUENTS OF HEALTH SIGNIFICANCE | µg/l |
|---|---|
| Benzene | 10 |
| Chlorinated Alkanes and Alkenes | |
| Carbon tetrachloride | 3 (T*) |
| 1,2-Dichloroethane | 10 |
| 1,1-Dichloroethylene | 0.3 |
| Tetrachloroethylene | 10 (T*) |
| Trichloroethylene | 30 (T*) |
| Chlorophenols | |
| Pentachlorophenol | 10 |
| 2,4,6-Trichlorophenol | 10 (Odour Threshold Concn 0.1 µg/l) |
| Polynuclear Aromatic Hydrocarbons | |
| Benzo (a) pyrene | 0.01 |
| Trihalomethanes | |
| Chloroform | 30 |
| Pesticides | |
| Aldrin/Dieldrin | 0.03 |
| Chlordane | 0.3 |
| 2,4 D | 100 |
| DDT | 1 |
| Heptachlor and Heptachlor Epoxide | 0.1 |
| Hexachlorobenzene | 0.01 |
| Lindane | 3 |
| Methoxyclor | 30 |

*T = Tentative Guideline Value. When available carcinogenicity data could not support a guideline value, but the compounds were judged to be of importance in drinking water and guidance was considered essential, a tentative guideline was set on available health-related data.

## IV. RADIOACTIVE MATERIALS

| | |
|---|---|
| Gross alpha activity | 0.1 Bq/l |
| Gross beta activity | 1 Bq/l |

## V. AESTHETIC QUALITY

| | mg/l |
|---|---|
| Aluminium | 0.2 |
| Chloride | 250 |
| Copper | 1.0 |
| Hardness (as $CaCO_3$) | 500 |
| Iron | 0.3 |
| Manganese | 0.1 |
| Sodium | 200 |
| Sulphate | 400 |
| Total Dissolved Solids | 1000 |
| Zinc | 5.0 |

| | |
|---|---|
| Colour | 15 True Colour Units (TCU) |
| Taste and Odour | Not offensive for most of the consumer |
| Turbidity | 5 Nephelometric Turbidity Units. Preferably <1 for disinfection efficiency. |
| pH | 6.5 - 8.5 |

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

4 cc/JAC

EFP/82.35

ENGLISH ONLY

# WHO GUIDELINES FOR DRINKING-WATER QUALITY

H. Galal Gorchev and G. Ozolins
Division of Environmental Health
World Health Organization

A paper presented at the International Water Supply Association Congress, 6-10 September 1982, Zurich, Switzerland

## 1. INTRODUCTION

The last edition of the WHO International Standards for Drinking Water[1] was issued in 1971 and that of the European Standards[2] in 1970. These Standards have now been reviewed, revised and combined and will be issued in 1982/83 under the title of the WHO Guidelines for Drinking Water Quality.

The old Standards have been widely used and applied by Member States. The WHO International Standards for Drinking Water have been among one of the most widely recognized and utilized WHO publications. The recommendations contained therein have been adopted in their entirety in a number of Member States while in others they have been used as the basis for establishing national standards.

There is a substantial difference between the old Standards and the new Guidelines. The new Guidelines cover more substances, primarily chemicals, than the old Standards did and there have been a few changes in the recommended levels between the two editions; but perhaps the greatest change is with respect to (1) the basic philosophy in their intended interpretation, application and use, (2) their presentation and reporting, and (3) the manner in which the Standards were arrived at back in 1971 as compared to the way the new Guidelines were developed. The purpose of this paper is not to describe in detail the Guidelines for Drinking Water Quality and the guideline values which WHO will be recommending (although a table of these is included as Annex I), but rather to highlight the basic differences between the old Standards and the new Guidelines and to briefly comment on some of the scientific issues which were faced in the preparation of the Guidelines.

## 2. APPLICATION AND INTERPRETATION

Possibly the best illustration of the change which has taken place in the basic approach used is the change in the title of the document itself, i.e. from "Standards" to "Guidelines". This change is intended to reflect more accurately the advisory nature of WHO recommendations so as not to confuse these with legal standards which are the responsibility of the appropriate authorities in Member States. In contrast to the old Standards, the Guidelines clearly

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[1] World Health Organization (1971) International Standards for Drinking Water, 3rd ed., Geneva, WHO.

[2] World Health Organization (1970) European Standards for Drinking Water, 2nd ed., Geneva, WHO.

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Ce document ne constitue pas une publication. Il ne doit faire l'objet d'aucun compte rendu ou résumé ni d'aucune citation sans l'autorisation de l'Organisation Mondiale de la Santé. Les opinions exprimées dans les articles signés n'engagent que leurs auteurs.

recognize the desirability of adopting a risk-benefit approach (qualitative or quantitative) to national standards and regulations. The establishment of drinking-water quality standards must follow a very careful process in which the health risk is considered alongside other factors such as technological and economic feasibilities. The establishment of standards without considering the practical measures which will need to be taken with respect to either finding new sources of water supply, instituting certain types of treatment, and in providing for adequate surveillance and enforcement, will not yield the desired results. In the Guidelines the need for careful consideration of the standard setting process including follow-up activities are very much emphasized.

With respect to the above, the old Standards were rather inflexible, although some consideration was given to the difficulties which might be faced with respect to meeting the standards in areas with water resources which were inadequate in volume or quality. In the years since the last edition of the Standards was published, literally hundreds of comments have been received concerning the standards, with many of them citing the difficulties they had encountered in applying them.

It goes without saying that the possibilities for providing safe water differs greatly among the different areas of the world. There are differences between the areas of plentiful water and areas of water scarcity. There are differences with respect to ability to provide for treatment technology between the developed countries and the developing countries. There are differences between the water supplies for large metropolitan areas and those for villages and rural areas. Each case will require separate considerations if the resulting strategies, including the enactment of standards, are to be meaningful and achievable.

In the development of the Guidelines a debate took place as to whether or not WHO should prescribe different levels of water quality for different areas or for different types of water distribution systems. There were those that argued for a two-tiered or perhaps even a three-tiered approach whereby minimal guidelines would be proposed for those areas which could not, either for technological or for economic reasons, meet the more desirable or safer levels which would be recommended for application elsewhere. It was realized, however, that the WHO Guidelines are concerned with establishing the health basis and the health risk and as such they should provide a common basis for setting individual standards. For this reason it was decided that only one degree of water purity could be recommended by WHO, while at the same time recognizing that in certain areas it would take a longer time to attain them which might include the adoption of some more inferior interim standards, but where the ultimate aim would be to attain at least the levels which have been recommended in the new Guidelines.

The emphasis of the Guidelines is placed first and foremost on the microbiological safety of drinking water supplies. More than half of the world's population is still exposed to waters that are not free from pathogenic organisms, resulting in infectious diseases that ultimately lead to increased mortality rates in the population. Those at greatest risk to water-borne diseases are infants and young children who have not yet developed a natural immunity, those people who are debilitated and the aged. For these, infective doses are often significantly lower than those required for infecting the major segment of the adult population. It is quite clear that in those areas of the world, programmes for assuring the chemical safety or the organoleptic qualities of drinking waters will be delayed except in those cases where it is quite evident that industrial effluents or agricultural run-offs are seriously endangering the water supply.

The new Guidelines while stressing the importance of monitoring and surveillance, clearly recognize their limitations, particularly for the small water supplies. For these in particular, it is emphasized that routine sanitary surveys and other protective steps are useful and often the only practical means for identifying existing or potential contamination problems and for instituting remedial measures.

## 3. FORM OF PRESENTATION

In contrast to the 1970/71 WHO International and European Standards, both of which were issued as single volume documents, the new WHO Guidelines are being published in three volumes. Each of these is intended to serve a different purpose and to a certain extent they are also directed towards different audiences. Volume I will present the recommended guideline values *per se* (as shown in Annex I), together with essential information required to understand the basis for the recommended guideline values as well as information on monitoring requirements and where possible suggestions regarding remedial measures. This volume is primarily intended for those who are engaged in the standard setting process, as well as those that are responsible for the provision of safe drinking water. For each of the recommended guideline values, the toxicological and epidemiological basis for choosing a given value, and the health risk involved, are summarized including information on uncertainties, safety factors, multimedia routes of exposure, etc. Special attention is also given to the ways and means in which these guideline values are to be applied and used.

The second volume, which will contain some 400 pages, is essentially an environmental health criteria document covering those substances/contaminants which were examined with a view to recommending guideline values. This volume contains a review of the toxicological, epidemiological and clinical evidence which is available. This volume elaborates greatly on the health risk information presented in Volume I and should be considered as a vital companion document.

Volume III of these Guidelines is intended to serve a very different purpose. It will contain recommendations and information concerning what needs to be done in small communities and in rural areas with respect to safeguarding their water supply. While it will detail some methodology concerning sampling and analysis of water supplies, a much greater emphasis is being placed on sanitary surveys and similar means of investigating the possibilities of contamination, particularly due to the presence of pathogenic organisms. The sampling and analysis of water supplies are limited to the basic techniques of multiple tube and membrane filtration as concerns bacteriology and simple methods for residual chlorine determination. This third volume is intended primarily for those authorities and people at the community level whose responsibilities entail the protection of public health or who may work in areas of general sanitation, etc. This volume is to be produced in much greater number and in more languages than will be possible with the other two in the hopes that these Guidelines can reach and be used by the local authorities in as many developing countries as possible.

## 4. PREPARATION

The way the new Guidelines were prepared also differs greatly from the previous editions. The approach used in preparing the earlier editions was generally for a few experts or an institution to prepare a draft document which, after some external review, was then submitted to a WHO expert committee for the final review and determination of the standards which were to be issued.

The preparation of the new Guidelines took over three years and involved the active participation of nearly 30 Member States, literally hundreds of scientists and meetings of ten Task Groups. This effort was started in 1978 as a collaborative activity between WHO Headquarters and the WHO Regional Office for Europe. A planning meeting was convened in Copenhagen in 1978 where the basic plan for the development of the Guidelines was made. During 1979 the Danish International Development Agency (DANIDA) joined this effort by contributing funds to cover much of the costs involved.

Each of the major aspects of drinking water quality, i.e. microbiological, biological, chemical, organoleptic and radiological, was covered separately, in each case the relevant chapters being reviewed and finalized by a group of experts in the respective fields who made recommendations concerning the guideline values themselves. In the case of the chemical aspects, this was further divided into two sub-groups - one concerned with health-related

inorganics, with the other dealing with health-related organic constituents of drinking water. At various stages, the different sections of the document were reviewed by the national focal points for the WHO Environmental Health Criteria Programme which in many cases provided valuable input with regard to information available within their respective countries. The document was also reviewed by other international organizations and individual experts.

A final meeting to approve Volumes I and II of the Guidelines in their entirety, and in particular the recommended guideline values, was convened in Geneva in March 1982. It is expected that Volume I of the Guidelines will be issued prior to the end of 1982, with Volume II being issued during 1983.

Volume III, i.e. Guidelines for Drinking-Water Quality: Surveillance of Rural Community Supplies, is still under preparation and a meeting to review and finalize it is to be convened in Bangkok in December of this year.

## 5. GUIDELINE VALUES

The nature of the guideline values for drinking-water quality which WHO is recommending is to be interpreted along the following lines:

(a) A guideline value represents a concentration or a number which ensures an aesthetically pleasing water and does not result in any significant risk to the health of the consumer.

(b) The quality of water defined by the Guidelines for Drinking-Water Quality is such that it is suitable for human consumption and for all usual domestic purposes, including personal hygiene. However, water of a higher quality may be required for some special purposes such as renal dialysis.

(c) A guideline value is to be used as a signal: (i) to investigate the cause when values are exceeded with a view to taking remedial action; (ii) to consult with authorities responsible for public health for advice.

(d) The guideline values specified have been derived to safeguard health on the basis of lifelong consumption. Short-term exposures to higher levels of chemical constituents, such as might occur following an accidental spill, may be tolerated. The amount by which, and the duration for which, any guideline value can be exceeded without affecting public health depends on the specific substance involved.

(e) In developing national drinking-water standards based on the WHO Guidelines, it will be necessary to take account of a variety of local geographical, socioeconomic, dietary and industrial conditions. This may lead to national standards that differ appreciably from the guideline values.

In the following few sub-sections some of the basic technical issues involved with respect to the various aspects of water quality are highlighted. As mentioned before, the recommended guideline values are presented in Annex I. It is important to underline here that the guideline values by themselves are not a sufficient basis for their application or use - they must be taken into consideration along with the information contained in Volume I of the Guidelines and in some cases with respect to Volume II as well.

### Microbiological and biological quality

To ensure the absence of pathogenic bacteria and viruses, the new Guidelines recommend that for all types of water supplies, whether they be piped or unpiped, treated or untreated, or bottled water, faecal coliform indicator organisms should be absent. With respect to total coliform counts, some leeway is permitted ranging from absence of total coliforms in treated waters entering the distribution system of piped supplies, to a limit of an occasional 10 organisms in unpiped supplies.

Routine methods for detection of pathogenic protozoans and helminths in water supplies are not currently available and coliform organisms are not good indicators for the presence or absence of these biological contaminants. For these reasons, guideline values were not proposed for these biological organisms.

Chemical safety

Some 800 organic and inorganic chemicals have been found in drinking-water. It is of course not possible (because of lack of health effects data) nor practical to derive guideline values and subsequently standards for all of these. When selecting the chemicals for which guideline values were to be established, the following criteria were used:

(i) the chemical was known to occur relatively frequently in drinking-water in significant concentrations;

(ii) the chemical in question had been identified as being potentially hazardous to human health; and

(iii) the means for monitoring (analytical methods) were known to be available for monitoring and control purposes.

The Task Groups concerned with chemical safety of drinking-water investigated in depth 37 and 46 inorganic and organic chemicals respectively and it was decided that sufficient health effects information was available for 9 inorganic and 18 organic constituents for which guideline values are now recommended. Where applicable, guideline values were based on an assumed daily water consumption rate of 2 litres per person. It was also considered that the guideline values should be protective for exposure to the chemical in question over a lifetime. In all cases, the recommended guideline values were strictly designed to protect human health and thus may not be adequate for the protection of aquatic life.

For the majority of chemicals for which guideline values are recommended, the toxic effect in man was predicted from studies with laboratory animals. Considerable uncertainties are inherent in doing this which arise from the following factors:

(i) extrapolation of toxicological data from animal to man;

(ii) extrapolation from high to low dose range at which the shape of the dose/response curve is not experimentally verified:

(iii) lack of information about the intake of the chemical from water as compared to other routes of exposure, e.g. food and air.

For a number of the chemicals guideline values were derived from the no-adverse-effect dose in animals (or man where such data are available) and applying a safety factor in order to arrive at an acceptable level of exposure.

Guideline values recommended for a number of organic substances that are carcinogens or suspect carcinogens were based upon a linear multi-stage extrapolation model. These guideline values are based upon the selection of acceptable risk of less than one additional case of cancer per 100 000 population assuming again a 2-litre daily consumption of drinking-water by a 70 kg man.

In the case of pesticides, the guideline values were derived from the acceptable daily intake (ADI) value set by the FAO/WHO Joint Meeting on Pesticide Residues with the assumption that not more than 1% of the ADI is allowed through drinking water. Since the ADI is derived on the basis of lifetime exposure, short-term excursions above the value such as those resulting from vector or aquatic weed control operations may be acceptable but would require careful surveillance.

Based on most recent information it has been found necessary to alter certain of the existing international standards for drinking-water. For instance, recent data on lead have determined that children and infants are particularly susceptible to the effects of lead. The guideline value for lead has accordingly been lowered in order to take these groups into consideration.

Considerable new information has accumulated since 1971 on the health effects of synthetic organic chemicals in drinking-water. Accordingly, it was possible to develop guideline values for a series of individual pesticides, polynuclear aromatic hydrocarbons, chlorinated alkanes and alkenes, certain chlorophenols and chloroform. Where the available health effects information was considered not entirely satisfactory, "tentative" guideline values were recommended.

The International Programme on Chemical Safety (IPCS) will considerably influence future updating of the guideline values for chemical substances. IPCS is a cooperative venture of the International Labour Organisation (ILO), the United Nations Environment Programme (UNEP) and WHO, and has as two of its main objectives the evaluation of the effects of chemicals on human health and on the quality of the environment and the development of guidelines on exposure limits (such as acceptable daily intakes and maximum permissible or desirable levels in air, water, food and the working environment) for various classes of chemicals. Such an international assessment of human exposure to chemicals will be of considerable help in increasing the data base for any future revision of the Guidelines.

Aesthetic and organoleptic constituents and characteristics

In the case of characteristics based on human sensory evaluation, judgement is often subjective. Aesthetic/organoleptic characteristics are very much subject to social, economic and cultural considerations, and the establishment of standards for the aesthetic quality of drinking-water should take into consideration implementation possibilities, and the existing socioeconomic and environmental constraints. When resources are severely limited, establishment of priorities becomes even more crucially important and such priorities should be set in relation to their direct impact on health.

Radioactive materials

Guideline values for radioactivity in drinking-water are based on the most recent recommentations of the International Commission on Radiological Protection (ICRP). The guideline values recommended for gross alpha and beta activities apply both to naturally-occurring radioactivity and any radioactivity that may have reached the water sources as a result of man's activities. They represent a level below which water can be considered potable without more complex radiological examination.

## 6. IMPLEMENTATION

Safeguarding drinking-water supplies is a major health responsibility. The provision of safe drinking-water has been identified among the priority elements of primary health care which is the basis of the WHO strategy for health for all by the year 2000. That this element be vigorously pursued is the responsibility of many sectors of the governments of the Member States as well as of various professional disciplines. It should be considered of paramount importance not only by the ministries of health, but also by those who are charged with the management of water resources and the provision of water supplies for large cities as well as for small communities and villages.

It is the objective of providing safe drinking-water, with the emphasis on safe, that makes the guidelines an integral element of the International Drinking-Water Supply and Sanitation Decade. Thus the three volumes of the guidelines provide not only an important tool to secure safe supplies but also to set the yardstick for measuring progress and achievements towards the Decade goal.

Their application, however, has to take into account that water-related communicable diseases are rare in developed countries and there the chemical, aesthetic and organoleptic attributes may be of primary interest. Decade activities in countries still suffering from water-borne infections should find useful support from the microbiological and biological parts of the guidelines, and from the advice on their application. Volume III is specially intended to bridge the gap between the mere publication of guideline values and their actual compliance under often adverse conditions, technically and organizationally as well as in terms of the available manpower.

It is the hope of the Organization that the guidelines will be actively utilized by the governments at all levels to set new drinking-water quality standards where they do not yet exist or to up-date and expand existing ones. Standards embodied in the laws and regulations of a national or provincial authority do not automatically translate into improved water supply services and better health protection of the population. Vigorous assessment, monitoring and enforcement are the complementary actions the guidelines are now calling for.

The new guidelines provide a sound scientific basis (although with still some uncertainties) for establishing standards with respect to health protection. Thus, the law and policy makers are hopefully in a better position today to make the existing economic and technological feasibilities match the criteria when setting drinking-water quality standards.

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## ANNEX I

### SUMMARY TABLE OF GUIDELINE VALUES

Note: It is not the intention in presenting the tabular summary of guideline values that individual values should be used directly from the table. Guideline values must be used and interpreted in conjunction with the appropriate section and the information contained within the document.

Values recommended in these guidelines are for total concentrations (i.e. all forms of substances present).

### I. BACTERIOLOGICAL QUALITY

| Piped Supplies | Number per 100 ml |
|---|---|
| (i) Treated water entering the distribution system | Faecal coliforms 0<br>Coliform organisms 0 |
| (ii) Untreated water entering the distribution system | Faecal coliforms 0; 3 coliform organisms in any one sample, 0 in any two consecutive samples, 0 in 98% of yearly samples. |
| (iii) Water in the distribution system | Faecal coliforms 0; 3 coliform organisms in any one sample, 0 in any two consecutive samples, 0 in 95% of yearly samples. |
| Unpiped Supplies | Faecal coliforms 0<br>Coliform organisms 10 |
| Bottled drinking water | Faecal coliforms 0<br>Coliform organisms 0 |
| Emergency supplies of drinking water | Faecal coliforms 0<br>Coliform organisms 0 |

### II. INORGANIC CONSTITUENTS OF HEALTH SIGNIFICANCE

| | mg/l |
|---|---|
| Arsenic | 0.05 |
| Cadmium | 0.005 |
| Chromium | 0.05 |
| Cyanide | 0.1 |
| Fluoride | 1.5 |
| Lead | 0.05 |
| Mercury | 0.001 |
| Nitrate (as N) | 10 |
| Selenium | 0.01 |

| III. ORGANIC CONSTITUENTS OF HEALTH SIGNIFICANCE | µg/l |
|---|---|
| Benzene | 10 |
| Chlorinated Alkanes and Alkenes | |
| Carbon tetrachloride | 3 (T*) |
| 1,2-Dichloroethane | 10 |
| 1,1-Dichloroethylene | 0.3 |
| Tetrachloroethylene | 10 (T*) |
| Trichloroethylene | 30 (T*) |
| Chlorophenols | |
| Pentachlorophenol | 10 |
| 2,4,6-Trichlorophenol | 10 (Odour Threshold Concn 0.1 µg/l) |
| Polynuclear Aromatic Hydrocarbons | |
| Benzo (a) pyrene | 0.01 |
| Trihalomethanes | |
| Chloroform | 30 |
| Pesticides | |
| Aldrin/Dieldrin | 0.03 |
| Chlordane | 0.3 |
| 2,4 D | 100 |
| DDT | 1 |
| Heptachlor and Heptachlor Epoxide | 0.1 |
| Hexachlorobenzene | 0.01 |
| Lindane | 3 |
| Methoxyclor | 30 |

*T = Tentative Guideline Value. When available carcinogenicity data could not support a guideline value, but the compounds were judged to be of importance in drinking water and guidance was considered essential, a tentative guideline was set on available health-related data.

## IV. RADIOACTIVE MATERIALS

| | |
|---|---|
| Gross alpha activity | 0.1 Bq/l |
| Gross beta activity | 1 Bq/l |

## V. AESTHETIC QUALITY

| | mg/l |
|---|---|
| Aluminium | 0.2 |
| Chloride | 250 |
| Copper | 1.0 |
| Hardness (as $CaCO_3$) | 500 |
| Iron | 0.3 |
| Manganese | 0.1 |
| Sodium | 200 |
| Sulphate | 400 |
| Total Dissolved Solids | 1000 |
| Zinc | 5.0 |

| | |
|---|---|
| Colour | 15 True Colour Units (TCU) |
| Taste and Odour | Not offensive for most of the consumer |
| Turbidity | 5 Nephelometric Turbidity Units. Preferably <1 for disinfection efficiency. |
| pH | 6.5 - 8.5 |

Reilly Tar meeting of 9/26/82

(6)

| | | |
|---|---|---|
| Michael Hansel | MPCA | (612) 296-7758 |
| Robert Polack | RTC | 317/248-6466 |
| CARL LESIFER | RTC | 317-248-6457 |
| ED SCHWARTZ BAUER | D+W | 612/340-2825 |
| John Craun | ERT | (412) 261-2910 |
| Francis McMichael | ERT | (412) 261-2910 |
| Stephen Riner | MPCA | 612/296-7297 |
| Paul Zerby | AG-Health | 612/341-7272 |
| David Hird | US DOJ | 202/633-2771 |
| Stephen Shakman | MN A.G. | 612-296-7216 |
| Jay Heffern | MPCA | 612 296-7303 |
| Dennis Coyne | MN A.G. | 612.296.7702 |
| Jim Pankenin | U.S.EPA Region V | 312-886-3009 |
| PAUL BITTER | USEPA Reg. V | 312-886-3007 |
| Raymond W. Throm | Minn. Dept of Health | (612) 623-5320 |
| Deborah WOITTE | USEPA, Enf., WASH. D.C. | (202) 382-3117 |
| Robert Leininger | U.S.EPA Region V | (312) 886-6720 |

OFFICE OF REGIONAL COUNSEL
ROUTE SLIP

| TO | FROM | TO | | FROM |
|---|---|---|---|---|
| [redacted] | | (2) | [redacted] | |
| KLEBENOW, CHERYL | | | LANGER, MARY | |
| | | | | |
| ALLYSON, BIRDIE | | | MAXWELL, ELIZABETH | |
| JBERT | | | MCPHEE, JONATHAN | |
| HEYER, DOROTHY | | | MORGAN, DOROTHY | |
| NEDICT, CRAIG | | | NEUBERGER, BABETTE | |
| BERMAN, MICHAEL | | | | |
| | | | PATTI, SEBASTIAN | |
| CALDERON, SUSAN | | | PLETTAU, RICHARD | |
| COLEMAN, ISALEE | | | RADCLIFFE, MICHELLE | |
| DAGGETT, THOMAS | | | RANDALL, SHEILA | |
| ERIC | | | REKAR, PAMELA | |
| | | | ROSEMARIN, CAREY | |
| VYAN | | | SCHULTEIS, JANE | |
| HERINE | | | SEGLIN, LISA | |
| BERT | | | SIMS, DAVID | |
| | | | SMALL-MORAN, GLORIA | |
| GARBER, DEBORAH | | | SMITH, ART | |
| | | | SMITH, MICHAEL | |
| | | | STEWARD, EVELINE | |
| HOWARD, LINDA | | | STRUBBE, CHARLES | |
| | | | SWOFFORD, ANNE | |
| Tebling | | | SZEMPRUCH, LINDA | |
| Y, PETER | | | TALBERT, PIERRE | |
| KYTE, LARRY | | | TALIAFERRO, DAVID | |
| ER, ROBERT | | | WALKER, MICHAEL | |
| BARBARA | | | WILLIS, GLORIA | |
| | | | | |

I have problems w/ the stmt on p. 3 — "we must decide what the best remedy is that a court would consider" — I suppose that it is

our job is advocate the most environmentally sound remedy that is cost effective - see §300.68 NCP - I think Bob L.'s characterization gets us off on the wrong foot. D

TO: Roger Grimes, Dave Ullrich, Bob Schaefer
FROM: Bob Feiringer
RE: Enviro-Chem and Reilly Tar status
DATE: 9-1-83

I will be out of the office next week, so here is a status report on Reilly Tar and Enviro-Chem.

1. Enviro-Chem

Richard Emory is preparing a referral memo for Courtney Price. Fred still thinks that they can get her sign-off by the middle of next week. If they have a briefing session he said that I should be there. I told him I would be out but that Dave Ullrich could be there. DOJ has been reviewing the referral package since August 23 and, consequently, should be up to speed when it is referred over from HQ.

The town of Zionsville signed the consent decree on August 29. The County of Boone will sign it on September 6. The State will sign it during the week of September 4.

All parties have been advised of the need to get the consent decree signed and lodged by September 16. The reason for this is that the contract with Chem-Waste Management ends on September 17.

I spoke with their attorney, Bill Jeffry, who confirmed that Chem-Waste will not

"de-mobilize" if the decree is lodged by then. If it is not lodged, they may take all of their equipment off the site and then bring it back when they are under contract with the generators pursuant to the entry of the consent decree.
(I just got hold of Fred Stehl and advised him that Dave Allrich will be in HQ on Wednesday and will be available for briefing prior that afternoon. He said he'd try to set something up for that time).

2. Reilly Tar
I have scheduled a strategy session for September 21 with David Hird, Steve Slickman, Dennis Coyne, Paul Bitter and Mike Hansel. Jim Pontonin will also attend because he will replace Bitter as OSC after October 1. The meeting will be to discuss what our settlement position should be. We can then commence negotiations with Reilly Tar about two weeks later. The other purpose of the meeting will be to decide what type of remedy is necessary for the site. Although this may sound premature it really isn't because:

a.) the scientific basis for the appropriate remedy in the Prairie du Chien/Jordan aquifer (regional aquifer) which is used for drinking water will be substantially

completed at that time

b.) the remedy for the other aquifers is simply a matter of policy or judgement. We must decide what the best remedy is that a court would consider. ] ?
For example, the court is much less likely to require Reilly Tar to control the uppermost drift aquifer which is very highly contaminated, but of little use now or in the future. The Platteville and St. Peter aquifers are respectively less contaminated and also of more utility. Thus, we will need to discuss the relative costs of the various remedies and weigh them against the wisdom of implementing them. The goal will be to arrive at a litigation strategy as well as a settlement strategy for the remedial aspects of the case. I see no reason why the litigation should be delayed due to a failure to decide upon the remedy that we want, unless Washington decides that it would interfere with a Superfund financed remedy.

4/15/83

1. soil logs of CA
- mid Oct complete analysis of logs

Will Wood used to work for Capule labs
- W-23, W-300, W-15, control
- 3 drift plus control } if time
- peat - control }

- Stan Covell, with K lab program
- protocol (150 pp) done today
- 2 wks
- mid September

Meeting in 3 wks

1. cores
2. $A_2O$ — tox / chem

300 borings
most to 90'
70 to 20'
100 USGS available
50 to bedrock

Helps w/ fluid layer

Resistivity in ~2 mos
hired by State (SF)
1° for hydrocarbon layer

Foerst support only EMSL/LV
- checked out CH2M-Hills labs
- adviser

---

SF:
- PB propose GAC decision
- Selkirk compare RT proposal w/ our info
+ make decision on remedy w/in a month

$600,000 for 2 columns GAC — less O+M
RT costs $500,000 → PAC more O+M
200,000
300,000 studies
(pilot plant)
→ 200-300 ppt
→ 4000 ppt

funded october or november
based on Paul's request this month
↓
build in Spring (SLP 15)
+
one gradient central well
↓
discharge to Creek
because ≤ background
Minnehaha
- discharge to sewer
is too expensive

Other aquifers (grad. control)

- drift → sewer
- St. Peter → Stathuile → sewer, grad. control (one in each)
- well in peat bog → treat on site
  - separation → sewer

Source Study
- MPCA w/ SF → Steve Reiner
- hiring w/in 2 mos → take one year
- Rielly Tar says forget it
- Bitter says hundreds have old wells
- $500,000 cost for all these aquifer (start up)
- O+M is very high
- selected top 3 contractors
  - D+ Moore
  - Donahuee/Bethel
  - CH2M-Hill
  - } w/in 2 mos
- state has had the $ since 1/83 (set up SF program) delay due to
- EPA held it 8/83-1/83

Capsule went under 3 mos ago

~~GCA should be helping the state put the~~

ERT has a model wh shows nature + extent of contamination
State is doing a model

Hind #2+3 — City

— 3 (i) issue

- Production request → Bitter
- Motions
  - deposition of ERT
  - prod. of docs
  - file one for ERT not to compel
  - not to compel City + State for intent of city + state → AC + AWP → not scheduled → Bolive

Depositions

- Wheeler + local employees, P.C. Reilly, T.E. Reilly, T.E. Jr is pres.
  - Chairman of bd
  - big guy
- 9/14 to 9/16 dep. of Churches (Chris + Susan Workman)

SLP → city mgr + health dept

5/1 discovery

6/1 dispositive motions

n/SJ

SSH: lawyer or client

9/26

1. drinking water $5.8 million (present "real" value)
   - gradient control
   - 7 + 9 re-opened (weekly monitor)
   - 1/4 + 1/2 yr monitor all others
   - $700M capital ; $100M/yr O+M
2. groundwater $7.9 million
   - I/Gabsville (W-300(?), W-105) 200 gal/min

---

276M

Mike Hansel

4.9 treat for 10 yrs
to
5.5 discharge to waste control all along

① $750,000 capital costs
124,000/yr O+M for 10 yrs
69,000/yr for 20 → 90 yrs
} deep source area

② - RI to pinpoint areas of 2-phase mixture
- W-13 + maybe 2 other wells should be pumped 30 gpm (total) for 6 months
} shallow source
$1.2 million (all in one year)
- area ~ Avg 7 fill + grade to minimize infiltration
- deed restrictions between Lake Street + Walker + the site ~~one year~~ →

(3.) Product Control

- Mt Airy
- I Holesville } none needed other than #1 above
- PdC SCP 15 + 10 plus 3 other locations
  (SCP 4, new well near Pathfinder Well & either well 112 or another well nearby) plus Methodist Hosp. well as a seasonal well (4-6 mos/yr); discharge w/o treatment to Chain of Lakes or Minnehaha Creek
  - w 112 not turned on except yr 10 to yr 100

(a) capital costs
- $150M long term
- 30M sewer connections
- replacement costs 230M of existing wells

(b) O&M costs
$55M/yr 0-10
$75M/yr 10-100

(c) present worth cost of $3.8 million

St. Peter aquifer
- 3 new monitoring wells
  one pumpout well 200 gal/min & discharge w/o treatment
- $10M storm sewer connection } capital costs
  80M 3 monitoring wells
  12M/yr for monitoring & pumping → O&M
  $700M present value

P/Pattenville & Drift
- 3 new wells in each all used as pumpout well → discharge w/o treatment

P Pattenville
- $30M sewer hookup
  50M well cost
  10M/yr O&M

$600,000 present value

Drift (30 M hookup
30 M well cost
12 M/yr O+M

.5 million present value

$2.6 million present value

O+M does not include labor + one person w/ supervision @ $50,000/yr will be added to handle all O+M (w/ fringe benefits)
Need 3 PCA staff for 3 yrs : $400,000/yr for 3 yrs incl overhead

(4) Multi Aquifer Wells $0.9 million
- plug wells into Mt. Simon (W-23, 105 + W-38 (Milwaukee Rd well) : only 105 is "unplugg
- PdC multiaquifer wells w/in zone of contamination
St. Peter
- inactive wells seal themselves

$20.6 to 21.2 present value (million)
$3 to 5 million past costs (PCA, MDH, MAG
- incl $400M EPA grant + 1 million cooperation agreement money
- most of it is direct appropriation from Congress for studies, analyses

Discharge (3.1 ng/l "carcinogenic" → EPA WQ criteria for surface discharge
3.1 µg/l "non-carcinogenic" → MDH

- pumping rates + locations come from "radio capture modeling"; + are lower than Hickok
- only removal of "source" is liquids
- where is SLP; SLP is responsible
- EPA + State say we are after RT
- Pollak says SLP should be here

(Gary Englund yesterday MDH)

Reilly Tar Meeting 9/27 10:30 A.M.
Pollak, Craun, McMichael, Thrown, Shah, Bitter, Woitte, Heffern, Hird, Hansel, Reiner, Lescher, Schwartzbaer, Gary Englund

Carl Lescher

- several areas: PAC RT may study, pumping rates + number of gc wells → may be areas of compromise
  - interest rate is negotiable (2% is too low)
- 7-10 days for ERT to do work + then meet in 1-2 4hour sessions + then lawyers get feedback + then non-technical issues discussed fast
- PAC would take 4-6 weeks + if it doesn't work they will concede for GAC

- RT (Pollak) said PAC tests would involve fed, state + SLP actively

Reilly Tar September 27 9:00 - 10:30AM

- Shakman said E. Schw called Popham last night + said SLP should pay a substantial amount of money
- Hansel 2-6 P.M meeting yesterday w/ Lescher, Craun + McMichael
  - PAC will do the trick says R. Tar
    ~~$100-300M~~ $100M pilot study of PAC
  - 1 month pilot study w/ 2 wks to report
  - deep source: pumping rates discussed
    RT said it may exacerbated the problem
  - RT said why pump drift: why not put in gc well
  - RT says why not 3 wells screened for both Drift + Plattenville
  - St. Peter: 3 monitoring wells + no pump out well

- PdC: We said 1500 gpm plus drinking water
  RT model is not "fine" enough
- Mt. Simon / Hinckley: they say a new well

1:00 → economics, PAC

PAC vs GAC
.4 - 1 million 3 - 3.2 million

-

Reilly Tar Response : E. Schwartzbauer

- subst. disagreement w/ the numbers
- good thing is that there is a specific program to respond to because there have been years of the various governments not telling R. Tar what to do
- we're still far apart
- GAC $5½ million present value
- next thing to talk about is the solution

Jay Hefern: period of time is limited & the essential elements will be implemented as stated by Hansel

Pollak: the routes to reach the goals are essential to be discussed.

Hird: feds will only meet w/ R. Tar if they agree to pay for it.

Pollak: shareholders believe they are being persecuted & what to come out of this w/ a perception of fairness & equity; An effort ought to be made for a technical dialogue
- every day meetings
- they need the definitive position of SLP & the feds

Hansel: what will Reilly do?

Pollak: R. Tar will participate in settlement cleanup

Hird: would Reilly stipulate to the remedy?

Schwartzbauer: it's not workable

Pollak: no problem w/ the concept & they will participate financially

task force mtg 1/22/81
11 30 AM

February 9-10, meeting with state

Fred Melanie
Doug Frank
Bob Mike

E+E / subcontractor for financial analysist for chemical business

February 4 — motion to dismiss will be filed
March 18 hearing date

Superfund amendment to complaint?

Tuesday — talk to Sandee
cc wdches Erica / Doug Steve
Bob / Melanie
Fred / Frank / Mike

① 1 mill unacceptable
② 100 M estimates for remedial action
③ we believe you can not afford this,
④ but we believe you can afford more than 1 M

Wed AM U.S. Atty Kathy Satula
Economic Adviser — Bob from Frank Monday AM

006332

# Technical Tasks

A. Mike Kosakowski

1. Experts

a. Life Sciences Contract

i. three PAH toxicologists

ii. three coal tar distillation + constituent experts

5/3 – resumes, articles + publications to us by next ~~Tuesday~~ Monday (sent yesterday)

5/7 – DT, REC, PB will review and prepare for conf call next week: opinions as to who is the best choice, type of questions we want to ask

5/7 – conf call next week w/ ~~Shaken~~ State, US. Attorney, DOJ, HQ + Region V

5/14 – conf call w/ experts on written questions to them

5/26 – interviews of experts

5/31 – selection of the expert for each category

b. Kirk Brown, soils chemist, FIT Contract

c. Geraghty & Miller, hydrogeology, under an "existing contract" which KOS is sending to me

d. Warren Thompson, wood scientist, FIT contract

e. epidemiology: Libb is working on doctorate
- we need to get his opinion in writing on the State study
- what about the "other study"

2. QA / QC
- EMSL Las Vegas will do it
- Kosakowski has to write up a scope of work for it which he can't do until the State sends him the names of the labs.

3. Studies
- GCA incorporated ~~has~~ is going to subcontract for soil samples in June or July (they will solicit bids from local firms). Kirk Brown is drafting the scope of work. There will be a "quick analysis" of the site and south of the site.
- GCA is analyzing NPCA samples of soil, groundwater, background from Mississippi River + tributaries, the swamp, etc.
- the GCA contract is from the EPA Office of Air; Mike will get me a copy

4. Mike is sending out:
- names, resumes + publications of six people (in two categories of expertise) to "all lawyers"
- the GCA analysis he has just recently received (now) + the GCA contract in about a week
- his EMSL scope of work when he gets it done
- the Geraghty + Miller contract (now) ⇒ waiting for that order to be processed — will send to me then
- Dr. Thompson's resume (now)
- any other resume of anyone else he has "under consideration" (from CAG or elsewhere) (now)

to me

5. things we need from Mike:
- scope of work and/or copy of contract which says we can use Kirk Brown + Thompson

will send

- scope of work for GCA analysis of state samples

copy of correspondence + will send to me

- the details behind the "other" epidemiology study

Kox will check it out + advise

- a report from Herman Gibb (if he has one) on what he thinks about the state study

Gibb evaluation

- EMSL scope of work (since state sent the names out today)

in typing

B. Paul Bitter / Superfund

remove + grout W-23

$200,000 { — Task 1: Investigation + P+S for abandonment of W-23
— Task 2: " + " of Sugar Beet Well and survey of on-site off site wells for abandonment

- an RFP was sent out for these two tasks on _____
- a contractor was selected on _____
- the contracts were signed on w/in 2 wks
- the contractors for the work are:

Hickok for engineering
subcontract for well drilling
_____ for _____ etc.

- they started work on _____ and will have done the following tasks ~~[illegible]~~ by the following dates:

| Task | Date |
|---|---|
| Well survey (on-site wells) → | 7/15/82 |
| Investigation of W-23 → | 9/1/82 ? |
| " of Sugarbeet well → | 7/15/82 ? |
| Abandonment of W-23 → | 10/1/82 ? |
| " of Sugarbeet well → | 8/1/82 ? |

- I need a copy of all contracts + RFP + scope of work

200,000 { TASK 3: Groundwater treatability + cost-effective analysis of treatment alternatives

30 to 50 wells

3/1/82 → RFP sent to State
4/1/82 → screened contractor qualifications
4/7/82 → State w/ EPA picked top five
→ 5/1/82 → work plans due from " " contractors
7/82 → State w/ EPA picks one consultant

6/15/82 → start work
1/15/83 → work complete

6 weeks
↑
(one cooperative agreement)

## Soil Treatability Study:

5/1/82 → Scope of work done by EPA + State
5/1 → 6/1 → cooperative agreement & funding
6/15 → RFP published
8/15 → consultant selected
9/15 → study begins
1/15/83 → consultant factors in completed research on peat
8/1/83 → study complete

(till peat oil water)

Kirk Brown

## Peat Research:

Cincinnati
↑
ORD → verbal promise from Steve Jones
↳ Better called him on 4/26 + Jones said its in sign off

- rate of biodegradation of peat + PAH matrix into smaller compds.
- background fuel of PAH (peat)

3/15 → request to MERL (?) (municipal) ← EPA shop
4/15 → RFP published
5/15 → consultant selected
6/15 → testing of peat / treatability of deposits begins
7/15 → research completed

I need copy of RFP

## Well Abandonment:

4/1/82 → MDH submits which wells (will do it in this week)
5/1 → cooperative agreement
5/15 → RFP published
7/1 → contractor selected
7/15 → cooperative agreement amended (sugar beet)
8/15 → contract amended
9/15 → cooperative agreement amended (W-23)
10/1 → contract amended
→ [illegible]

Paul Bitter also has to

1. get Kirk Brown's resume

Paul to do → 2. get Kirk Brown to come up w/ scope of work for GCA soil gas study (?)

6 wks → 3. submit SF info to Mary Bielefeld for another SF letter to go out to cover ... (?)

→ 4. advise if there are any other studies he's doing besides the above described one

5. assimilate the studies, data etc. which Pankonin worked on.

C. Mark Hult

- owes us the computer model and report for the State
- the review of the Hickok report for us
- EPA / USGS Interagency Agreement to continue USGS + Mark Hult services which we spent $300,000 for in FY'81:
  1. extent of contamination in soil + gw + refinement of transport model
  2. development of soils + gw treatability studies
  3. review of EPA/MPCA contractor work
  4. continue to monitor soil + gw
  5. we get to use USGS files + their labs w/ a 4 wk turnaround time

Leininger has to:

2 — call up → Dolgin + Hermann regarding "the case" on ~~$$~~ interrogatories

4 — send out the "Assignment List" to HQ + DC

5 — prepare $ request for the 5 Mylars ($300)

6 — call up Dr. Warren Thompson and

1. get acquainted
2. tell him what we need him for
   - Finch + maybe other depositions
   - consultation
   - maybe as a trial expert
   - trial preparation
3. find out what he has
   - Steve Reed briefing memo on Reilly TG process
   - other information
4. find out what more he needs
   - reports
   - data

Steve Reed 612-297-2710 - documents

5. what does he want us to look for in our document search?

3 — contact Marc Hult

1 — ask Kosakowski what he is sending the experts by when

## Legal Issues

- Magistrate / Discovery cut-off → special master 53 of FRCP
- Appealability of the judges ruling by us or them
- would we want to ↗
- what is discoverable & what isn't
- be prepared for discovery

10/8
1:00
Reilly Tar
Minneapolis

Federal Support of USGS

Hult needs more cash to make the program more liquid.
- fed input is limited by drafting of an IAG (FS)
- 9-12 months to close gaps
- Hult to coordinate and digest
- NRI — $5,000 for lab work
- USGS has to come up w/a product to State + EPA for approval of the final product
- proposal has been submitted
- $20,000 in cash is shortfall + w/State match $10,000
- Mark will prepare another proposal for additional funding
- Mark will submit two proposals based upon the State's uncertainty w/their funding.
- He needs to know the amount, source and type of money available from the State
- We need a memorandum of understanding from USGS
- NRI services go through Frank, but their analytical work has to be completed by 4/15 (end of K)
- GS can put a proposal w/in a wk of getting the funding OK from the State
- Project proposal ready by next Wednesday 10/15
- Melaie will send Hult a copy of an approved MOU w/accompanying paperwork.

003733

10/8
12:00
Reilly TAR
Minneapolis

EPA STRATEGY AND BRIEFING

DQ + MT have summarized almost all study + report info w/ one page summaries w/ a list also of summaries, a separate

Bill Scruton, MDH lab person on PAH

1 → 1 1
2
3
4

1 —
=
=

10/8
Reilly Tar
Minneapolis

Meeting w/ State, USA + EPA (HQ + V) 2:00

Tom Berg, USA

Discussions w/ Reilly to date

1. Berg w/ Reilly
2. What did State
3. What Feds want
4. What State wants

I

- USA talked w/ Reilly day before filing
- Reilly said "let's talk"
- USA + asst USA talked w/ 2 lawyers for Reilly Tar about roles of ~~the~~ industrialists, environmentalists, etc ... "platitudes"
- Reilly wanted cont. on M/I of State + City to 11/26 when hearing on M/D will take place. Reilly said we should hear M/D first since, if they win, then M/I is irrelevant
- Δ says "unfair to penalize us for past legal acts"
- W.S. Journal said GE is willing to clean up several sites (7)
- ~~treat water~~
- they said "treat the water" rather than barrier wells or excavation
- "reasonable + significant" effort
- if that doesn't work, then will they do other things? "maybe"
- USA would like a friendly, low key meeting w/ Reilly getting the ball in their court + see what they do w/ it.
- ~~no~~ - no technical details,
- a general discussion about money, to wit, USA said "total cleanup may be more than Reilly has" + they said "yes, ∴ we may have to go to the wall"

003735

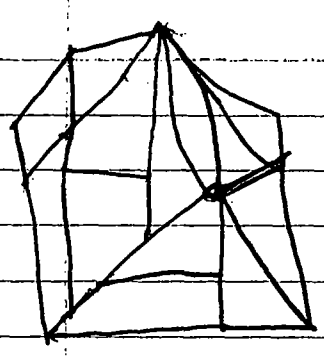
10/8
Reilly
121

II Shakman
- 1970 – 1973,4 discussions but not w/ g.w. problem wh was found in 1974; 75.
Jay wrote a ltr. to Reilly who said "It's the City's problem." No discussions at any time about "what is state doing how can you we help, etc. . . ". State asked for some data to supplement a survey + Reilly said "use discovery."
- Reilly suggested some joint field work, but didn't follow up on it.

III What do we want?
Hickah study is to determine remedial measures for everything. Removal of the source, limit or contain the source

"Pilot plan study" is being funded by St. Louis Park due to their having to shut down wells

USA : what can be done
Hickah study



003736

10/8
Reilly To
Minneapolis

US Attorney

Motion to Intervene set for Friday at 11:00
M/D by 11-25
USA ≠ M for Cont.
M/D Less to be filed by 10/24
Memo in opp. at least 7 days before hearing

10-9
Leilgton

Post-Conference Meeting

TB - maybe lawsuit was pre-motion

Letter asking for cont → Judge on M/I
Magistrate will hear the M/I

003737

OCTOBER 26
MN. DEPT of HEALTH
REILLY TIRE CASE

About ½ of the proposed pumpage would be for municipal use (½ of 5000 gal/minute)
- the table represents several pumping plans
- the wells would be constantly running and there should
- #6 & #16 wells should be minimally used because they are outside of the zone of contamination (16 uses 40 million gallons/month presently)
- does subsidence, water shortage, etc problematic
- SLP isn't in favor of abandoning or sharply reducing the use of #16 ∴ Hickok will define what it means by "reduced use"; it basically means pumpage rates prior to the other well closings.
- put in a table of pumping rates which reflect what the current system was designed for.

Well 17 (New Hinckley well being drilled by SLP)
- will slow down the cleanup
- the plan does not take into account this well

Well 85
- probably doesn't have much effect on Mt Simon/Hinckley now, because the original 12" well bore is collapsed
- no analyses yet from the MS/H aquifer
- W-23 may well have contaminated it & maybe W-85 in the past also, but at this time

Franton/Belleville (W-38) is contaminated.

John Erdman : lead speaker for Hickok  Eugene A. Hickok
Other Hickok : Mark Simonett, EA Hickok, ~~[illegible]~~, George
Dick Koppy : SLP
James J. Geraghty - Geraghty + Miller, Inc
D. Coyne
M. Convery MDH
~~Dick~~ Richard Ferguson : MPCA
Marc Hult USGS

Q

Isn't Weston going to go into some of these issues regarding cost/benefit, how far to go w/ cleanup, etc.

Centralized treatment system would require a great increase in pumpage rate + it may not by geo hydrologically possible

Marc Hult – is not confident about the chemical data because of the "source" problem + the misidentification problem; see for example fig. 7
- HPLC works well for simple samples
- see comment #22 on page 89
- large difference between HPLC + GC/MS

Jim Geraghty said that if the wells pump, again the St. Peter + find that the water is OK, then shut them off since it doesn't cost that much

M Hult

II Monitoring
- 2 dimensional model does essentially what Hickok did in their analysis
- computer model could take into account well interference
- 2D model is available at USGS but 3D is not ready for use yet
- costs of monitoring are not in report nor have plans + specs been set up; a unit cost range for well construction will be submitted
- Inorganic monitoring in the upper levels can show clear plumes
- Hult said you need more wells in the St. Peter aquifer which is 165 feet thick ∴ you need well nests
- need to put in some upgradient wells for drift + near surface aquifers

Buried bedrock valley
- zone of contamination in middle drift does not overlie the bedrock valley
- it is not clear yet whether there is contamination going into the valley (through leakage) + contaminating the St. Peter; it is important to address this in order to prevent this problem if it hasn't happened yet + to rectify it if the problem exists

III Quality Considerations

- Well W-38 rather than W-11 is the one wh is estimated to have 50ppt or an 20yr ave
- #11 MF = MS/H is an unknown quality at this time
→ acenaphthene (MHult) may be a good indicator

IV Other
- need regional data on water use, well const, etc but see p. 50 for the answer
- SLP capacity is reduced by 50% rather than 30% but 50 is reduction in design capacity while 30% is in actual reduction.
-

Tomorrow: start @ 9:30 room 408

OCTOBER 27, 1981

I Questions on Criteria

a) 10/21 ltr of MDH to Hickok re Pigs Eye Plant
- 1 mechanism in WWT plant is particulate removal; influent concentration of <1 ppt of PAH; also activated sludge helps, perhaps
- no idea of whether such low levels would be reduced by such treatment

b. Report figures zero background for Miss. River

c. MDH figures 1 ft of fish/day is too high a consumption estimate; a bio accumulation factor in fish is based upon a number of assumptions wh should be set forth

II Soils

a. Would capping cause problems w/ storm water runoff → you'd need further controls for runoff

b. Grout curtains are not called for here because they wouldn't affect the vertical flux

Last Spring a memo discussed the UCC type of solution + discarded it as not a good type of treatment or measure for the South Pond area.

Perhaps the Company does not want to look at the possibility because it would affect the grad control ~~well~~ well situation + thereby double their work

Why not test to determine the general character of the underlying till

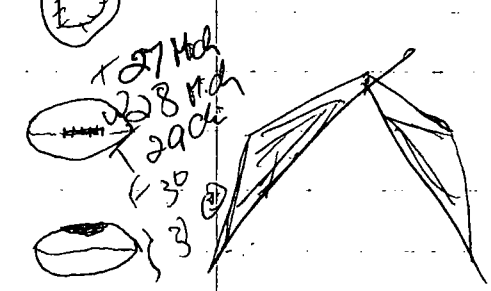
Capping may not be a good idea 50' is where the stuff is

Pumping out the fluid would increase the surface area + is right as long as you keep pumping its OK or if you completely remove the liquid hydrocarbon phase its OK if you stop

Contaminated Soil as far east as Hwy 100 (2 sq miles) — see G18-11 could be inferred by analogy to

Sanitary Servers of 12" or larger were figured to have adequate capacity

Conventional Treatment



PAH Removal - Wastewater Treatment Plants

| Pollutant | Treatment Process | Inf.(1) | Eff.(1) | % Removal |
|---|---|---|---|---|
| Acenaphthene | Activated Sludge | 12000 | <40 | >99 |
| | Activated Sludge | 27000 | <40 | >99 |
| | Activated Sludge | 30000 | <40 | >99 |
| | Activated Sludge | 8700 | <40 | >99 |
| | Activated Sludge | 13000 | <40 | >99 |
| Fluoranthene | Clarification/ Sedimentation | 1100 | 400 | 64 |
| Naphthalene | Activated Sludge | 100 | <7 | >93 |
| | Activated Sludge | 41000 | <7 | >99 |
| | Activated Sludge | 300 | <7 | >98 |
| | Activated Sludge | 1000 | <7 | >99 |
| | Activated Sludge | 80000 | <7 | >99 |
| | Activated Sludge | 95000 | <7 | >99 |
| | Activated Sludge | 3000 | <7 | >99 |
| | Activated Sludge | 51000 | <7 | >99 |
| | Activated Sludge | 93000 | <7 | >99 |
| | Activated Sludge | 17000 | <7 | >99 |
| | Activated Sludge | 1900 | <7 | >99 |
| Benzo(a)pyrene | Clarification/ Sedimentation | 1200 | <20 | >98 |
| Benzo(b) fluoranthene | Clarification/ Sedimentation | 36000 | 6000 | 83 |
| Benzo(k) fluoranthene | Clarification/ Sedimentation | 800 | <20 | >97 |
| Anthracene/ Phenanthrene | Activated Sludge | 100 | <10 | >90 |
| | Clarification/ Sedimentation | 1500 | 400 | 73 |
| Fluorene | Activated Sludge | 15000 | <20 | >99 |
| Indeno(1,2,3 -cd)pyrene | Activated Sludge | 2000 | <20 | >99 |
| Pyrene | Clarification/ Sedimentation | 8000 | 200 | 75 |
| | Activated Sludge | <100 | 100 | 0 |
| | Activated Sludge | <100 | 100 | 0 |
| | Activated Sludge | 900 | 200 | 78 |
| | Activated Sludge | <100 | 300 | 0 |

(1) All data in parts per trillion

No information on: Benz(a)anthracene and Benzo(b)fluoranthene

Reference: Environmental Protection Agency, "Treatability Manual", EPA-600, 8-80-042e, July 1980, Vol. 1,2,3,4 & 5

~~① Roger~~
→ ② Leininger

# HAZARDOUS MATERIAL CASE LOG

SITE NAME: Reilly Tar
LOCATION: St. Louis Park, Minn.
SITE NUMBER:
ENFORCEMENT TEAM: Leininger / Jim Pambrun

| DATE IDENTIFIED | DATE REFERRED FOR ENFORCEMENT | DATE OF LSC MEETING | DATE OF REFERRAL TO HDQTRS* | DATE OF CASE FILING |
|---|---|---|---|---|
| 7/15/79 | 7/22/79 | 10-24-79 | | |

| DATE | COMMENTS/NEXT PROJECTED ACTION | *PROJECTED AND ACTUAL |
|---|---|---|
| | Minnesotta has requested that USEPA bring an action against this company due to severe land and groundwater contamination. The City of St. Louis Park contracted to hold Reilly harmless from Minnesotta actions but not from federal actions. LSC meeting on 10-24-79 will discuss possibility of bringing a fed. action. | |
| 10/24/79 | LSC meeting discussed possible action in fed. dist. ct. but had to be adjourned early | |
| 10/26/79 | Meeting w/ Dale Bryson who said HQ could provide some paralegal support | |
| 10/30/79 | Ltr. to HQ asking for specific paralegal help drafted | |
| 11/2/79 | LSC meeting to conclude meeting held on 10/24 | |
| 11/2/79 | LSC meeting held: legal theories discussed were CWA, RCRA + Fed. Common Law Nuisance. RCRA is only viable theory to go on. Leininger will submit memorandum of law by 11/16 on applicability of RCRA to Reilly Tar fact situation. | |
| | Why can't we do a Case Development Plan as far as we can + refer to HQ + get them doing some of the legal research?? | |
| 11/19/79 | My preliminary research indicates that 35 statutes are not held to have retroactive application unless expressly stated as such. Nevertheless I am perfectly willing | Dale |

to go all out in preparing a CDP now + move this case along. I'll meet w/ Pankanin on Monday + set up a schedule + see what further info. we need from MACA.

006351

4/18

DSB: Call from Dennis Coyne yesterday what took place at meeting below.
He + Sandy were in Minn on Friday doing separate tasks. Discussed overfiling, turf designations.
Spannous wants to proceed on federal action. Will do anything that is necessary.
DSB will dictate a telecon + copy Rosman on it.
Meeting on Friday (tomorrow) w/ NPCA.

Joby Ellwell called (city mgr) of St. Louis Park + will make witnesses available

Tom Burg will personally litigate the case, although Frank Weaver is assigned till.

---

Filing on Lilly by May 15

---

Call Frank Weaver and arrange a meeting

RCRA is ~~retrot~~ retroactive according to a memo

Complaint by April 24th

00 6356

4/17/80

Allegations:

Notice pleading for the site activities

Defendants: Reilly
City
City Dept of Housing + Dev Authority } address
– all the above are persons w/in meaning of

Bob call Steve + ask about Low to sue the City
+ the H + Redevelopment Authority.
Larry get a certified copy of the quit claim deeds

Contamination of g.w. ~~[illegible]~~ (607 R)

Reilly Co

| | |
|---|---|
| Terry Hoffman, Minnesota Pollution Control Agency | CONTROL NO. ORA |
| SUBJECT AND DATE<br>RE: Litigation for Reilly Tar lawsuit | DATE REC'D 9/18/80<br>DUE DATE 10/3/80 |

| REFERRED (1) | (2) | (3) | (4) |
|---|---|---|---|
| Enforcement Div. | Jenny Toepfer 9/22 | 9/23 | Toepfer received 9/25/80 |
| DATE 9/18/80 | | | |

| | |
|---|---|
| PLY SENT TO | DATE RELEASED |
| REMARKS<br>Prepare for ~~XXXXXX XXXXX~~ Signature: As appropriate<br>Copy of reply for ORA with GREEN copy of control slip<br>Melanie - Pls prepare response for RA signature outlining the level of funding to be used | ACKNOWLEDGED - DATE ☐<br>NO ANSWER NEEDED ☐ (Explain in remarks) 001706 |

Form 5180-1 (6-72)
REPLACES FWPCA FORM 72
N-73 WHICH MAY BE ).

(Remove this copy only, do not separate remainder.)

MAIL CONTROL SCHEDULE

Terry Hoffman, Executive Director
Minnesota Pollution Control Agency
1935 West County Road, B-2
Roseville, Minnesota 55113

Dear Ms. Hoffman:

Thank you for your letter of September 17, 1980, inquiring of the United States Environmental Protection Agency's (U.S. EPA) litigation strategy for the Reilly Tar and Chemical Company lawsuit.

Because of the complexity of this case, several technical issues must be addressed in the very near future. Members of both our staffs in coordination with the U.S. Geological Survey (U.S.G.S.) have developed a prioritized list of these technical issues. U.S. EPA plans to fund several of these tasks through an interagency agreement with the U.S.G.S. The formal documentation is being drafted. It involves $50,000 in financial support for fiscal year 1981 to the U.S.G.S. in exchange for field services including: 1) a one time "snapshot" of the aerial extent of hydrocarbon contamination in the Prairie du Chien-Jordan aquifer, 2) analysis of aqueous samples taken from the Hinckley wells (W-23 and W-105) on the former Reilly site and other wells discovered in the field which might be exacerbating the contamination problem in the St. Louis Park area, and 3) soil coring (and analysis) taken on-site and to the south of the former Reilly site. The project officers are Ms. Melanie Toepfer, U.S. EPA, and Mr. Marc Hult, U.S.G.S.

The analytic work for the above-described project and other samples, including an interlaboratory quality assurance program, can be conducted through a U.S. EPA-Midwest Research Institute (MRI) contract. The contract is for approximately $75,000 of analyses only and expires April 15, 1981. Therefore, all field work for fiscal year 1981 must be done within the next six months. The project officer for this contract is Mr. Frank Biros of the U.S. EPA, Hazardous Waste Task Force in Washington, D.C.

Hopefully this outline will be of use to you in developing the Minnesota Pollution Control Agency's strategy for this case. If you have any further questions, please do not hesitate to call.

Sincerely yours,

John McGuire
Regional Administrator

bcc: Hinkle
Leininger
ORA - 886, w/control slip
Klebenow - 886, w/control slip
Grimnick - 886, w/control slip

001707

10-22 10/21/80 10/21/80 10/31/80 DS 10/31

MTOEPFER.sri CL 6-6748 10-20-80

| FACSIMILE TRANSMISSION RECORD | | | | | |
|---|---|---|---|---|---|
| ADDRESSEE | Bob Leininger, Enforce. Div, Region 5 (353-2094) | | ORIGINATOR | Shanna Halpern HWTF 755-7537 | |
| FM | ID | FLT | DATE 4/25/80 | PAGES OF | |
| TO | REMARKS | | | | |

4 pages - please call on arrival

EPA Form 5040-5 (11-79)

| | |
|---|---|
| United States of America, plaintiff<br>v.<br>Reilly Tar & Chemical Corporation<br>and<br>Housing and Redevelopment Authority of St. Louis Park, defendants. | Civil Action No. —<br><br>4/24/80 /cy 4/ |

## COMPLAINT

Plaintiff the United States of America, on behalf of the Administrator of the United States Environmental Protection Agency (EPA), by way of Complaint says:

## NATURE OF ACTION

1. This is a civil action instituted pursuant to section 7003 of the Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. §6973. This action seeks injunctive relief to repair the harm caused, and to prevent the future harm posed, to health and the environment by the Reilly Tar and Chemical Corporation site, now owned by the Housing and Redevelopment Authority of St Louis Park.

## JURISDICTION AND VENUE

2. This Court has jurisdiction pursuant to 28 U.S.C. §§ 1331, 1345, and 1355 and 42 U.S.C. §6973. Venue is proper in this district pursuant to 28 U.S.C. §1391 (b) and (c) because _____ and local rule _____

3. Notice of the commencement of this action has been given to the State of Minnesota pursuant to 42 USC 6973

## DEFENDANTS

4. Reilly Tar and Chemical Corporation (Reilly Tar) is a corporation established under the laws of the State of Indiana and registered to do business in the State of Minnesota from _____ to 1973. The claims against Reilly arise from acts committed in the course of its business in the state of Minnesota, City of St. Louis Park, at a time when it was registered to do business in that State.

5. The Housing and Redevelopment Authority of St. Louis Park (Housing Authority) is _____ duly organized

6. Defendant Reilly and defendant Housing Authority are both persons within the meaning of §1004(15) of RCRA, 42 U.S.C. 6903(15).

2 of 4

## DEFINITIONS

7. Several terms or expressions of particular importance will be repeated in the course of this Complaint. These terms, as used in this Complaint, are defined and explained below:

(a) "Carcinogen" means any substance which has been proven to cause cancer, or is suspected to cause cancer, in human, animals or both.

(b) "Subsurface water" means water in upper subsurface geological layers, whether contained in bedrock or flowing through soil.

(c) "Groundwater" means subsurface water found in the zone of saturation, the top of which is known as the watertable. The zone of saturation is that area where all voids are filled with water.

(d) "Migration" means the movement of chemicals or leachate away from a zone of high chemical contamination to a zone of low or no chemical contamination whether by runoff, percolation through the soil, solubility in ground water supplies, diffusion through air or other physical means.

(e) "Coal tar" means the liquid condensate produced by the dry distillation or carbonization of coal. Coal tar is a complex mixture of chemicals which may be separated into various fractions, including creosote, by distillation. Creosote in turn, is a mixture of 200 or more chemical constituents including phenols and poly-nuclear aromatic hydrocarbons (PAH) such as phenanthrene, anthracene, and benzo-[a]-pyrene.

(f) "Aquifer" means any underground rock, sand or other subsurface geological formation which stores or conveys water or is capable of storing or conveying water, and from which water supplies may be drawn.

(g) "Toxic" or "Toxicological Effect" means any of the adverse biological or health effects that result from either acute (short-term) or chronic (long-term) exposure to a chemical.

# GENERAL ALLEGATIONS



## Description of the Site and Surrounding Area

8. The area in issue, herein referred to as the "site" consists of approximately 80 acres. The site is located in St. Louis Park, Minnesota; it is east of Pennsylvania Avenue, north of Walker Street, south of West 32 Street and west of the Louisiana Avenue extension.

9. The site is surrounded by several small industries and prime residential areas. A small stream known as the Minnehaha Creek is located nearby.

10. The site is located in an area with a very complex geohydrologic structure. There are several major aquifers under the site; the St. Peter, Jordan and Hinckley aquifers are used by St. Louis Park as a water supply and the Prairie du Chien aquifer serves as a ground water source for ~~the Twin Cities area~~ Minneapolis and St. Paul.

11. There are at least 25 ~~wells~~ ungrouted or partially cased wells in the vicinity of the site which may permit waters from near-surface aquifers to flow downward into deeper bedrock aquifers. At least — private drinking water wells are located in the vicinity of the site.

## Ownership of, and Operations on, the Site

12. In 19— , defendant Reilly Tar purchased the site from ——. In 1917 Reilly Tar constructed a plant on the site for the distillation of coal tar, the manufacture of creosote and the treatment of railroad ties and other wood products with preservatives made from coal tar derivatives.

13. Defendant Reilly Tar continued in operation on the site for over 50 years during which time it handled, stored and otherwise disposed of coal tar and creosote waste products on the site. Coal tar and creosote wastes have penetrated more than 50 feet into the soil on site and have migrated into soils at least 1,000 feet from the site.

14. Defendant Reilly Tar discontinued coal tar distillation in September of 1971, creosote treating operations in June of 1972 and the wood treatment works in July of 1972.

4 of 4

15. In April of 1972 the City of St. Louis Park and Reilly Tar entered into a Purchase Agreement to purchase all but 4 acres of the site. On October 12, 1972, the City of St. Louis Park obtained possession of the entire (?) site although the real estate transaction was not closed until June 19, 1973

Info. is too heavy when did the project

16. On June 21, 1973, the City of St. Louis Park conveyed the site by quitclaim deed to the present owner, defendant Housing Authority. The site has not been developed by the defendant Housing Authority.

Contamination of the Soil

Contamination of the Groundwater

CLAIM FOR RELIEF

PRAYER FOR RELIEF

RECEIVED
APR 24 1980
ENFORCEMENT DIVISION
EPA-REGION V

REILLY TAR:

8/12/80 Send comments back to Dolgin on complaint via express mail; call her to see if any further problems exist

8/15/80 Dolgin submit complaint for review

8/20/80 Case filed

8/29/80 Motion to Produce, interrogatories sent to U.S. Atty for filing

10/6/80 Response due from defendants on discovery requests

10/17/80 Finish review of discovery submittals

10/24/80 Submit supplementary interrogatories and request to admit to U.S. Attorney for service upon defendants

10/31/80 Prepare list of witnesses and begin interviews

11/7/80 Send out notices of deposition

12/80 - 2/80 Complete discovery depositions

3/81 Prepare for trial; negotiations

4/81 Trial or settlement of the case

006431

Note: The defendant may make one of several pre-trial motions under Rules 12(b), 12(c) or 56, in which case, further ~~activities~~ efforts on the case will have to be directed toward the preparation of memoranda in opposition to such motions. Preliminary research has been done in anticipation of th

Reilly Tar interrogatories

1. Get copy of other federal interrogatories to follow form
2. Get copy of SRC Motion to Produce
3. See if MacPhee has interrogs
4. Has the State submitted a Motion to Produce? If so, why don't we do our's by M/P? Why can't Reilly answer the State's interrogatories since the State answered all of Reilly's? Why does EPA/USA love to file now if Reilly doesn't love to? If Reilly can "follow up" on us why can't U.S. EPA "follow up" w/ its interrogatories to Reilly?

We don't want to "supplement" the State w/o assurances from Reilly

| | |
|---|---|
| 1-3 | corp |
| 4-7 | ownership + occupancy |
| 8-10 | environmental offices |
| 11-13 | permits, etc |
| 14-15 | sources + uses of water |
| 16 | diagrams etc. re to site processes |
| 17-18 | raw materials |
| 19-21 | coal tar to the site |
| 22-29 | storage |
| 30-39 | refining |
| 40-46 | products' storage + transport |
| 47-55 | processes for wood treating |
| 56-58 | storage of treated wood |
| 59-60 | trenches + pond basins |
| 61-64 | waste treatment |
| 65-68 | $H_2SO_4$ disposal + $ZnCl$ + contains + other wastes |
| 69-70 | studies + reports |
| 71-74 | tests, etc. |
| 75 | complaints |
| 76-78 | leaks |
| 79-80 | fires, explosions, illness |

000260

MST 10/9/80

1st meeting Reilly — USEPA

①

~~motor pool~~
~~airport~~
Dick Koppy
Rick Ferguson 296-7735
10/9/80

$ 20,000 USGS needed
USGS 1st priority — modelling

Reilly Mtg. U.S. Atty office
B15

---

← Bug opening remarks
too apologetic
location / spatial arrangement

← Schwartzbauer — settlement conference
off record discussion

mtg precipitated in casual discussion
overview of mtg (2 weeks ago) stage setting

problems — (it's everybodies)
1) us proving imminent + substantial endangerment to pub. hel
2) has Reilly committed a tort?
Solvents Recovery
Vertac
common law nuisance
— history of operations
— state of art
— negligence
3) did Reilly cause problem
4) statute of limitations
J. Caine — factual
when did damage occur
5) Reilly v. SLP — responsibility for remedial measures
price to get rid of Reilly was responsibility for cleanup of site
6) remedies

carcinogenicity
PNA's — ubiquitous

20 sources in SLP
PNA's / phenols → combustion products

VP Mondale — "Saudi Arabia of peat"

006204

Reilly perceived that state folks were wed to the excavation + barrier well remedy

J. Geraghty — "Identify, monitor, leave it in place"
gw

"rationale + practical solution"
nobody done anything wrong

family owned co. / fighters
won't be pushed
significant sums of money / reasonable

Berg response
reemphasized R's committment of significant / reasonable
skepticism

Keppel "I'm not skeptical!"

Dr. Francis McMichael — eliminate threat via source removal
— he wants to talk about treatment of water supply as protective
— alternative remedials

PAH's focus
found in SLP, but not in [high] ~~[illegible]~~
3 aquifer systems
op C-J — most important

| table well # | pumpage MGD | design pumpage MGD | peak demand pumpage % of design | total PAH | WHO # list analysis |
|---|---|---|---|---|---|
| St. Peter 3 | | | | | |

lower aquifer

iron removal treatment yes or no

006205

(2)

iron treatment

Fl, BaP, BkFl, 6 PAHs bghiPe d(ipp) / (6th) 66Fl not analyzed here

| | | | Who | ppt | | iron treat |
|---|---|---|---|---|---|---|
| | 3 | 1 | <32 | 66-305 | (c) | Y |
| well no. | 4 | 21 | 2-70 | 73-1170 | | N |
| | 5 | 1 | 5-32 | 10-280 | | N |
| | 6 | 16 | <32 | 8-320 | | Y |
| | 7 | 4 | <53 | 205-450 | | N |
| | 8 | 2 | <32 | <280 | | Y |
| | 9 | 1 | <53 | <280 | | N |
| | 10 | 2 | 750-880 | 2540-4670 | | Y |
| | 14 | 4 | 6-20 | 40-180 | | Y |
| | 15 | 8 | 190-910 | 2100-5610 | | Y |
| | 16 | 2 | <32 | 4-280 | | Y |
| | 11 | 3 | 5-41 | 5-270 | | Y |
| | 12 | 2 | <32 | 70-290 | | Y |
| | 13 | 4 | <36 | 5-270 | | Y |
| | | | | highest & lowest | | |
| | total | 71 | | | | |

(c.) sum of specific PAH analysis (11-20) upper bound results from assigning a conc. equal to the detection limit for results reported below detection. Lower bound results by assigning zero to results reported below detection

iron content aeration + → flocculation
reduction via high pressure sand filtration.
reduction to prevent deposition & coloring in consumer uses
chlorination + fluoridation all wells (state req.)

006206

PAH

21 found in SLP water supply

table

NAS — "Particulate Polycyclic Organic Matter"
1972

— not carcinogenic
± uncertain or weakly
+ carcino
++, +++, ++++ strong carcino

2 rings

| | |
|---|---|
| 2MN | No rating |
| Ace | " |
| bP | " |

3 ring

| | |
|---|---|
| F | — |
| A | — |
| Ph | — |

4 ring

| | | |
|---|---|---|
| BaA | + | |
| Ch | ± | |
| Fl | — | tp (Van Duuren, 1976) |
| P | — | tp |
| 9,10 bPh | not rate | |
| 1,2,6,7 thPy | " | |

5 ring

| | |
|---|---|
| BaP | +++ |
| BbFl | ++ |
| BjFl | ++ |
| BkFl | ++ |
| 1,2,3,4 dBA | ++ |

ti

bar graph

wells 4, 7, 9, 10, 15
WHO reference 200 ppt
Fl
bkFl
BaP
ipp bghi Pe

summation # / display of individual compounds

0062

table — worst case comparison of PAH exposure from drinking $H_2O$ (untreated SLP #15) v. food, cigarette inhalation / ambient air

2.6 - 16 ng/ day (2 liters day) #15
1.6 - 16 food
A
Fl
Py
BaP
PaH total

---

Battelle Press, 1980
A. Bjorseth + A.J. Dennis (eds)
PAH : Chemistry + Biologic Effects

table — range of PAH levels in foodstuffs

"Human Exposures to PAHs" in Carcinogenesis, A Comprehensive Survey vol. 1

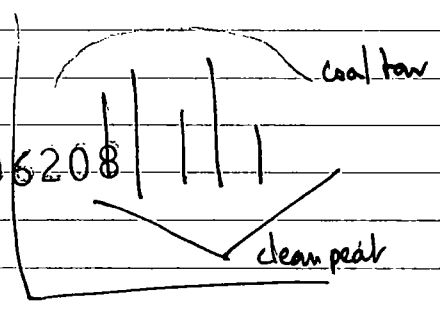
I. Freudenthal

---

problems treatment of materials close to the levels of detectability

---

graph — coal tar
used crankcase oil
petroleum asphalt
clean peat



Potential PAH sources

city dump (5)
city dump old gravel pit

paving and roofing (5)

coal + fuel dealers (4)

misc. (5)
Flame Prestolite
D+A
golden Auto Andrac

rubber (3)

non-site specific (3)
city road tanning
septic tanks

map — location of other sources to SLP, + site

MPCA spill list

1000 GPM
1 PPB pumpage
total PAH 5 lb / yr
5,000,000 billion / gallons of $H_2O$

treatment

100 - 10 ppt — range
don't want to interfere w/ Fe treatment
WQ varies
other pilot studies Bassow + Saxena
Pitts, Pa, Phili ES+T
Monoghela R, Delaware R 12(7)
1978

p. 795-798

treatment process — PAHs 006209
but what else?
effective + independent of supply

treatment

① finished water quality — SCP area
blending

MDH report — before & after / hipressure filtration

2½ gpm ft² rate → 84% removal

→ powdered activated carbon

PAHs — slightly soluble & hydrophobic

expensive, regardless of organics
designed for TOC

2-5 ppm TOC
2-5 ppb PAH

some systems selective — chemical oxidation w/ $H_2O_2$

(higher conc. coke plants / commercial facilities
worth further invest.
not capital intensive

$H_2O_2$ : PAH
2:1

2 liq. streams
design from direct exp.

BaP — PAH
ppb — ppm

EPA - 570/9-79-020 — W. Germany
Bergland, Gjessing + Shippenund (1979)

$$\frac{C_0 - C}{C_0} = e^{-kt} \qquad k = 0.018 \text{ min}^{-1}$$

$H_2O_2$ Crucible Steel Co. → not measuring PAH's
no sludge

Berg - thoughtful presentation thank you
treatment is part of the solution
treatment — affect on plume movement

table — aqueous solubility mg/l — 006210
plume movement in $H_2O$
1) aqueous
2) particle movement (sorption)

flow retardation area — where does phenol
hydrocarbon phase
WHO interpretation
why PAHs if coal tars

retardation of movement of organics
due to solubility in $H_2O$

133 Texarkana
19 Flame
10,15 SLD

2-phase migration
hydraulic movement v. chemical movement

W23

Berg — what have you done? what about source?

Schwartzbauer — treat water
J. Geraghty — "general statement"

10 + 15 only for treatment

McMichael — yes
no Fed ~~[illegible]~~ standards in raw supply
just Fed criteria

all data in public domain
phenols — ubiquitous

006211

(5)

post mtg.
USEPA / US Atty

what

big picture procedure
joint effort —
they're willing to do more than presented

how to proceed ?
consent decree
1) admission
2) study of problem w/ remedial plans

Reilly worth 500M

MPCA → $5-10 Million

analysis / evaluation of meeting

006212

List of Attendees at Meeting at U.S. Attorney's Office on October 9, 1980 - 9:00 a.m.

I. United States Government

Thomas K. Berg
United States Attorney
(612) 332-8961

Francis X. Hermann
Assistant U.S. Attorney
(612) 332-8961

Melanie S. Toepfer
Environmental Scientist
EPA (Chicago)
(312) 353-2110

Robert Leininger
Attorney
EPA (Chicago)
886-6720

Frank Biros
Chemist
Hazardous Waste
EPA (Washington, D.C.)
(202) 426-8710

Dennis Devlin
Tech. Staff (Environmental Eng.)
Washington, D.C.
(202) 472-3500

Fred Stiehl
Attorney
EPA (Washington, D.C.)
(202) 426-8710

II. State of Minnesota

Stephen Shakman
Assistant Attorney General
296-7703

Lovell Richie
MPCA
296-7339

Dennis Coyne
Assistant Attorney General
296-7702

Dr. Roger DeRoos
Minnesota Department of Health
296-5320

Bill Miller
Assistant Attorney General
341-7272 (Rep. MN Dept. Health)

Jay Heffern
MPCA
296-7305

III. St. Louis Park

Dick Koppy
Director of Public Works
920-3000
5005 Minnetonka Blvd.
SLP, Minnesota 55416

Allen Hinderaker
St. Louis Park City Attorney
335-9331
9394 IDS Minneapolis, MN 55402

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer
Attorney
Dorsey Law Firm
(612) 340-~~2745~~ 2825

William J. Keppel
Attorney
Dorsey Law Firm
(612) 340-2745

006213

IV. Reilly Tar and Chemical Corporation - (Continued)

Mr. Polack
General Counsel, Reilly Tar and Chemical Corporation
(317) 638-7531

Dr. Francis Clay McMichael
ERT, Inc.
(412) 261-2910

John C. Craun
ERT, Inc.
(412) 261-2910

Dr. Robert W. Dunlap
ERT, Inc.
(617) 369-8910

Hult —
get natural peat samples

SLP well head reports

006215

List of Attendees at Meeting at U.S. Attorney's Office on October 9, 1980 - 9:00 A.M.

I. United States Government

✓Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) (Washington, D.C.)
Fred Stiehl - Attorney - EPA (Washington, D. C.)

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General- MPCA
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General MDH
Jay Heffern - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works
Allen Hinderaucker - Atty city of St. Louis Park

IV. Reilly Tar and Chemical Corporation

✓Ed Schwartzbauer - Attorney } outside Duncy
William Keeppel - Attorney }
Mr Rob Polack - General Counsel, Reilly Tar and Chemical Corporation
Francis Mr. F. McMichael - ERT, INC. Tech
John Mr. Craun - ERT, INC.
Mr. Dunlap - ERT, INC. VP
Bob

006216

List of Attende at Meeting at U.S. Atto y's Office on October 9, 1980 - 9:00 A.M.

I. United States Government

Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) "
Fred Stichl - Tech. Attorney

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General
JAY HEFFERN- MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer - Attorney
William Koeppel - Attorney
Mr. Pollack - General Counsel, Reilly Tar and Chemical Corporation
Mr. McMichael - ERT, INC.
Mr. Craun - ERT, INC.
Mr. Dunlop - ERT, INC.

| | |
|---|---|
| BaP | <.87 |
| PA | <1.9 |
| 1234 DBA | <2.5 |
| CH | 39 |
| P | 2300 |
| BP | <6.5 |
| A | 120 |
| F | 11 |
| Fl | 790 |
| 1,2 BA | <3 |
| Ace | 2700 |
| BjFl | 2.1 |
| 9,10 BA | <2 |

15

6.13.80

hi — 598

low — 2100

---

4

1150 — hi

15 — low

| | | |
|---|---|---|
| 2MN | | |
| 4 Ace | 200 | 829 |
| BP | 530 | |
| A | 99 | |
| PA | <1.5 | 128.3 |
| Fl | 120 | |
| P | 6.8 | |
| Bk Fl | <14 | 25 |
| BaP | <2.5 | |
| BPR | <8.5 | |
| 1,2,6,7 ThP | <14 | 169.3 |
| BeP | <15 | |
| 1234 DBA | <7.3 | 1152.1 |
| CH | <7.5 | |
| F | 4 | |
| 9,10 BPA | 120 | |
| ~~1,2 BA~~ | <2.0 | |

1.9.80

5.30 low

006218

(1)

| | | | |
|---|---|---|---|
| DP | <47 | | |
| A | 53 | | |
| P | 12 | | |
| Fl | 87 | —112 | |
| 1256 DBA | <5 | 92 | 1.9.80 hi .390 |
| BbFl | <7.5 | — | 6.13.80 low 35 |
| | <.25 | 185.75 | |
| PR | | | |
| Ace | <2 | | |
| 1267 thP | <100 | | |
| F | <15 | | |
| | 61 | | |

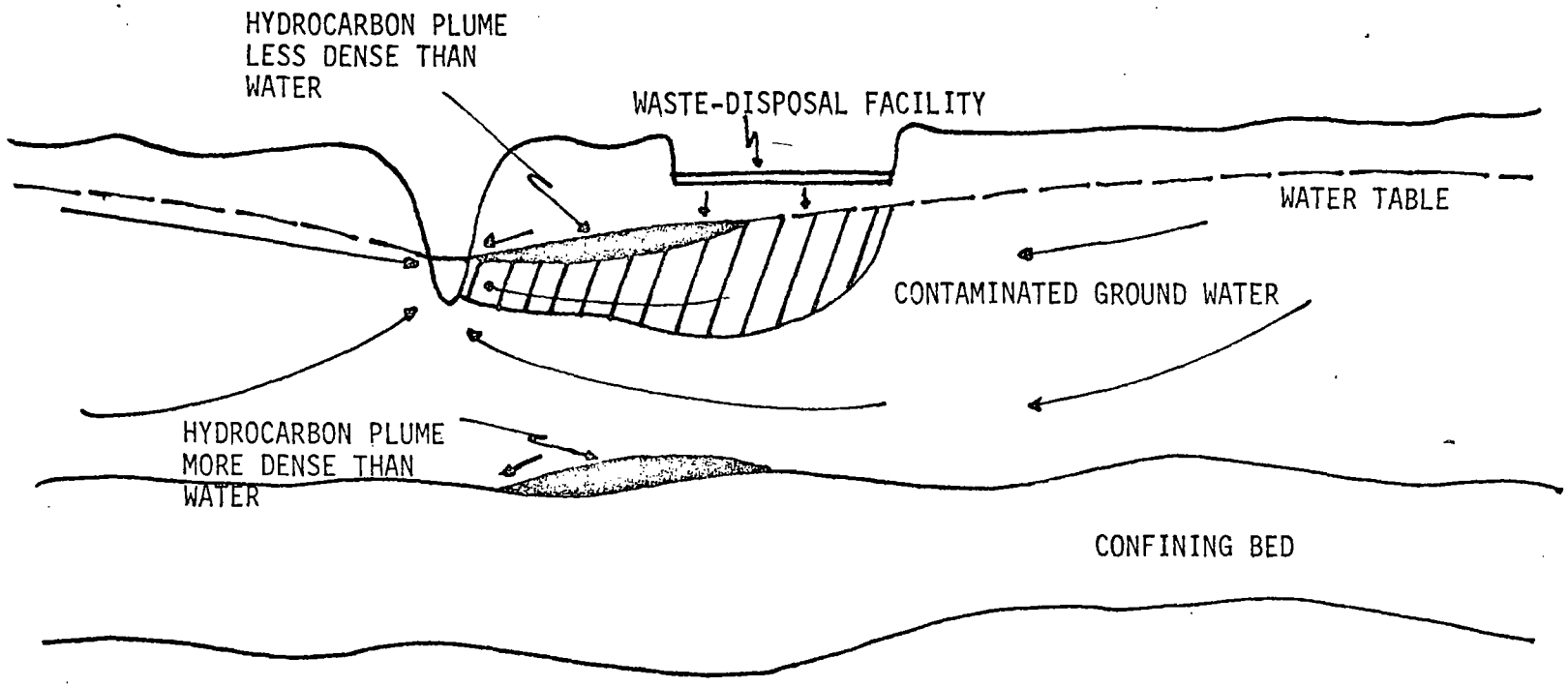
(9)

| | | |
|---|---|---|
| BaP | | |
| BP | | |
| A | 35 | |
| PA | 2.8 | |
| Fl | <2 | 6.20.80 |
| P | 5.8 | 78 hi |
| PR | 32 | 11.5.79 |
| | <.5 | 0 low |
| | | or 76 |

(10)

| | | |
|---|---|---|
| A | | |
| PA | 490 | |
| Fl | 72 | |
| F | 750 | 1.29.80 hi 4025 |
| 12 BA | 2100 | low or 2539 |
| 910 bPA | 140 | 3615 |
| Bk Fl | 37 | |
| 123 + DBA | 2.9 | |
| Bp | 23 | |
| P | <240 | |
| BaP | <120 | |
| | <50 | |

FIGURE 1. HYDROCARBON PHASE POLLUTANT MIGRATION




006185

Melanie Toepfer
9/30/80
MPCA

① ... ①

Dennis ?

① map shot

W-23 , W106 ,

Marc
Mike
Rick
SLP

time series

MRI participate

MRI / Kansas

prepare a work assignment

procedures from Frank QA/QC

6 wks.
APIC can get N9/1
what's their competency?

Frank — capabilities

2 wks for 1 sample / or small # of samples
cores
~ 10/wks.

turn around time — schedules for analysis

estimated costs for each analysis

LE contract $1000/sample

lead time

① MRI contract continuance

EPA — no extra cash
— sole source E+E through

October, 80

6 mo. April 15, 81
extension

2 yr. time frame — MPCA

basic data report

Engineering Support Analysis Section

manual reporting initially — retain confidentiality

STORET

WATS / STORE

006186

Steve Reed - mass balance of coal tar into

Mike
Rich
Marc
Dennis
Steve

1. aerial - WQ plume
2. duff + platteville - cores
3. other aquifers / pathways through the St. Peter
4. time series

W23
core from inside 28
and in duff outside

lead time to locate some more wells

inventory of cores already frozen

snapshot - mass
volume

TOC / → sample v. background

Frank to MRI
Marc to MRI

well 10+15

HPLC? → get to MPCA so they know budgeting for #11
DOC on all samples too? , sequential work

#12 PAH work for #9
Gary Englund has MDH / 200 samples / PAH analysis throughout the state
can be coordinated to eliminate costs

---

source investigation - historical perspective

006187

Epidemiologic Final Report
copy to answer of 78

Jerry Sunday's
Pickock

Ken Stevenson — MN AG
being microfilmed

'78 ⟶ MDH

Scuntin
Health Risk Assessment '78, '79 not organized
1980, MDH
90% →

Serco / SLP / municipal well
Louisiana Ave. borings
Dave Grey's file

USGS — cores
individual organics other than PAH
bacteriological
field data

HRA Kriswell, MPCA
pond water analysis 4x

Oak Park Village — cores Natural Biocentric (2)
thin layer chromatography

MDH Brown Engineering Report (value)
'38
'64
'70

006188

GSA

Hilton

call Dennis, → come in on Monday
call Mike → MDH

Marc Hult, Tuesday AM → USGS

HH data capture

MST
12/17/80

to Dennis Devlin
from M. Toepfer

14 pages

no fax at U.S. Atty-Mn.
but FBI has a fax.

Mr. Francis X. Herman
Assistant U.S. Attorney
District of Minnesota
110 South Fourth Street Room 234
Minneapolis, Minnesota 55401

Dear Frank:

Regarding the ~~November~~ October 9, 1980, meeting with Reilly Tar and Chemical (Reilly), members of the U.S. EPA technical staff -- M. Toepfer, D. Devlin and F. Bricos -- feel that Reilly and their consultant, Environmental Research and Technology (ERT), misrepresented or ignored the available information and consequently made false assumptions relating to the contamination of soils and groundwater in St. Louis Park (SLP). In this letter, we identify our concerns and the misrepresentations made by ERT.

All of the data presented by ERT during ~~October 9, 1980~~ the meeting is publically available and had been generated through state and local agencies or their contractors. ERT has not independently generated any new information.

~~ERT's presentation was given by Dr.~~

Dr. F. McMichael began the technical presentation with a discussion of the basic difference in philosophy between the "public" and 000190
Mr. McMichael stated that the public expects removal of the source of contamination and thus protection of human health. ERT suggested an alternative method of treatment (hydrogen peroxide chemical oxidation rather than carbon adsorption) of the water supply to protect human health and leaving the contaminant source in the ground. In Mr. McMichael's opinion, this program is the most cost-effective solution for the protection of

human health.

We question ERT's disregard for cleanup of the source of environmental contamination. It may be that it is more cost-effective over the long term to remove or isolate and contain the source of contamination. Source containment or removal would reduce the time period for treatment of potable waters. (This information is being developed by Hickock and Associates through a contract with the Minnesota Department of Health (MDH) and information generated by the U.S. Geologic Survey's (U.S.GS) transport model.)

Creosote (coal tar) is a mixture of over 200 chemical compounds produced through the destructive distillation of coal. Creosote contains neutral oils, tar acids and tar bases.

Neutral oils include the polynuclear aromatic hydrocarbons (PAHs) and lighter molecular weight compounds such as benzene. PAHs are a large chemical class including carcinogens, co-carcinogens, tumor-promotors and tumor-initiators. ERT presented a table from the National Academy of Sciences (NAS) (1972) illustrating the relative carcinogenicity of certain PAHs. The U.S.EPA Water Quality Criterion (WQC) for PAHs (1980) is a more recent discussion of the carcinogenicity, co-carcinogenicity, synergisms and antagonisms of these compounds. Table 1, Column 1 is the information presented by ERT. Table 1, Column 2 ~~characterizes~~ further identifies the gradations of carcinogenic activity of these PAHs and other PAHs detected in SLP that were not listed by ERT. The information in Column 2 is from the WQC and from another oftenquoted general toxicology reference by N. Irving Sax.

Table 1. PAH Carcinogenicity

| Chemical | ERT[1] | U.S. EPA |
|---|---|---|
| **2 carbon rings** | | |
| 2-methylnaphthalene | No rating | No rating[3] |
| Acenaphthalene | No rating | experimental tumor-initiator[3] |
| Biphenyl | No rating | experimental tumor-initiator[3] |
| **3 carbon rings** | | |
| Fluorene | - | No rating[3] |
| Anthracene | - | Tumor-initiator[2] |
| Phenanthrene | - | experimental carcinogen[3] |
| **4 carbon rings** | | |
| Benzo(a) anthracene | + | Tumor-initiator[2] |
| Chrysene | ± | experimental ~~neoplasm~~ carcinogen[3] |
| Fluoranthene* | - | Tumor-promotor[2] |
| Pyrene | - | Co-carcinogen, Tumor-promotor[2] |
| 9,10-benzanthracene | No rating | No rating[3] |
| 1,2,6,7-tetrahydropyrene | No rating | experimental carcinogen[3] |
| **5 carbon rings** | | |
| Benzo(a) pyrene* | +++ | carcinogen[2] |
| Benzo(b) fluoranthene* | ++ | carcinogen[2] |
| Benzo(j) fluoranthene | ++ | carcinogen[2] |
| Benzo(k) fluoranthene* | ++ | carcinogen[2] |
| Dibenzanthracene | ++ | carcinogen[2] |

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Other PAHs detected in SLP water supply and not listed by ERT-

| | |
|---|---|
| Benzo(e) pyrene | carcinogen[2] |
| Perylene (dibenz (a,h) anthracene) | experimental tumor-initiator[3] |

Table 1 Continued



| | |
|---|---|
| Benzo (g, h, i) perylene * | co-carcinogen [2] |
| O-phenylene pyrene * | No rating [3] |

| | |
|---|---|
| +++ | ~~strong~~ very strong carcinogen |
| ++ | strong carcinogen |
| + | weak carcinogen |
| – | not carcinogenic |

[1] Particulate Polycyclic Organic Matter, NAS (1972)
[2] Ambient Water Quality Criteria for PAH, EPA-440/5-80-069 (1980)
[3] Dangerous Properties of Industrial Materials, N.I. Sax (5th ed., 1979)
* PAHs listed in the WHO standard.

The tar acids consist of the phenolic compounds such as phenols, cresols and other alcohols of benzene. Phenolic compounds are toxic causing denaturation of cellular proteins. Phenol is a demonstrated tumor-promotor in staged exposure with benzo(a)pyrene. [VanDuuren, B.L., "Tumor-promoting and Co-Carcinogenic Agents in Chemical Carcinogenesis" in C.E. Searle (ed.), Chemical Carcinogens, ACS Monographs #172, American Chemical Society, Washington, D.C. (1976) 24.)

The tar bases consist of acridines, pyridines, quinolines and naphthylamines. Acridines are very strong skin irritants and photosensitizers. Pyridines less so. Quinolines are retinotoxic. Several naphthylamines are demonstrated human carcinogens and are present in creosote.

ERT focused on PAHs in the water supply of SLP. They failed to present the possible health implications of other coal tar compounds as described above. There was no mention of phenol concentrations in the water supply of SLP. Data collected on phenol concentration is the historic basis for the SLP contamination problem. To date, ~~concentrations of~~ analyses for tar bases have not been ~~conducted~~ completed. Samples (four) taken during the summer of 1980 from SLP municipal wells are being analyzed for tar base compound concentrations by U.S. EPA. Also, future work will include analyses for tar bases.

ERT further limited their discussion of the significance of PAH contamination in the SLP water supply to six PAHs. The six PAHs are: fluoranthene (Fl), benzo(a)pyrene (BaP), benzo(K)fluoranthene ~~(BKF)~~ (BkFl), benzo(b)fluoranthene (BbFl), o-phenylenepyrene (ipp) and benzo(g,h,i)perylene (BPR). The six PAHs were chosen by ERT because these six compounds ~~were~~ constitute the PAHs of the World Health Organization (WHO) water quality standard of 1969. The WHO standard is 200 ng/l (ppt) for the concentration of the six PAHs listed

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above. The standard does not address other PAHs which are carcinogens, co-carcinogens, tumor-initiators and tumor-promotors. The WHO standard was developed with the realization that there are many different PAHs (greater than 100), but the technology was not available for the analysis of each compound. Therefore, Fl, BaP, BkFl, BbFl, ipp and BPR were chosen as qualitative representatives of the PAH class for monitoring purposes.

U.S. EPA has very recently (October, 1980) developed a WQC for PAHs. The rationale for the WQC is: "For the maximum protection of human health from the potential carcinogenic effects due to exposure of polynuclear aromatic hydrocarbons through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time." Therefore, the levels which may result in incremental increase of cancer risk over the lifetime estimated at $10^{-6}$ (1 cancer victim : 1,000,000 persons) corresponds to a recommended criterion of 2.8 ng/l (ppt) (ingestion of water).

ERT presented several tables and figures summarizing the PAH contamination in the SLP water supply. Table 2 is the summary table of PAH concentrations presented by ERT. ERT concluded that only SLP wells Nos. 10 and 15 are contaminated sufficiently to necessitate water treatment. However, this analysis used only the 6 WHO PAHs (Table 2, Column 4), not total PAH. The analytic techniques being used screen for 21 PAHs and Table 3 lists the compounds which have been detected in each of the closed municipal wells. If the concentration of PAHs are used to determine when a municipal supply well should be closed, we feel that total PAH concentration should be used and not only the six WHO PAHs. The decision-making standard therefore would not be 200 ppt (WHO-6 PAHs), but 2.8 ppt

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start here!

1

Table 2. PAH concentrations in SLP wells (ERT interpretation)

| 1. Aquifer | 2. Well No. | 3. No. of samples | 4. WHO PAHs (ppt) | 5. hi-low range of detected PAHs (ppt) | 6. iron treatment |
|---|---|---|---|---|---|
| St. Peter | 3 | 1 | <32 | 66-305 | yes |
| Prairie du Chien-Jordan | 4* | 21 | 2-70 | 73-1170 | no |
| | 5 | 1 | 5-32 | 10-280 | no |
| | 6 | 16 | <32 | 8-320 | yes |
| | 7* | 4 | <53 | 205-450 | no |
| | 8 | 2 | <32 | <280 | yes |
| | 9* | 1 | <53 | <280 | no |
| | 10* | 2 | 750-880 | 2590-4670 | yes |
| | 14 | 4 | 6-20 | 40-180 | yes |
| | 15* | 8 | 190-910 | 2100-5610 | yes |
| | 16 | 2 | <32 | 4-280 | yes |
| Hinckley | 11 | 3 | 5-41 | 5-270 | yes |
| | 12 | 2 | <32 | 70-290 | yes |
| | 13 | 4 | <36 | 5-270 | yes |

* wells closed by MDH because of PAH contamination

☐ ~~wells~~ PAH contamination > 200 ppt (WHO standard)

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Table 3. List of PAHs Detected in Each of Closed SLP Municipal Supply Wells
* WHO PAHs

<u>Well no. 4</u>

2-methyl naphthalene
acenaphthalene
biphenyl
anthracene
phenanthrene
pyrene
fluoranthene *
benzo(k) fluoranthene*
benzo(a) pyrene *
benzo (g,h,i) perylene*
1,2,6,7- tetrahydropyrene
benzo (e) pyrene
1,2,3,4-dibenzanthracene
chrysene
fluorene
9,10- benzphenanthrene

total 16
WHO 4

<u>Well No. 7</u>

2-methyl naphthalene
biphenyl
anthracene
pyrene
fluoranthene*
benzo(b) fluoranthene*
1,2,5,6
perylene
acenaphthalene
1,2,6,7- tetrahydropyrene

total 11
WHO 2

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fluorene

Table 3. Continued

Well no. 9

benzo(a) pyrene *
biphenyl
anthracene
phenanthrene
fluoranthene *
pyrene
perylene

total 7
WHO 2

Well no. 10

anthracene
phenanthrene
fluoranthene *
fluorene
1,2- benzanthracene
9,10 - benz phenanthrene
benzo (k) fluoranthene *
1,2,3,4 - dibenzanthracene
biphenyl
pyrene
benzo (a) pyrene *

total 11
Who 3

Well no. 15

phenanthrene
benzo(a) pyrene *
1,2,3,4 - dibenzanthracene
chrysene
pyrene
anthracene
fluorene
fluoranthene *
1,2- benzanthracene
acenaphthalene
benzo(j) fluoranthene *
9,10- benz phenanthrene

total 12
WHO 3

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(EPA- total PAHs). Using the EPA WQC all of the SLP municipal supply wells are contaminated with PAHs.

ERT argued that Reilly was not responsible for the PAH contamination. ERT proposed that PAH contaminants are immobile and that the contamination of any well was caused by a localized sources of PAH. Such conclusions warrant comment for several reasons.

First, wells nos. 10 and 15 are located to the northeast of the Reilly site. ERT stated that these are the only two wells necessitating clean-up. The general direction of groundwater movement in this area is ~~moves~~ southeasterly. It is interesting that Reilly is willing to pay for cleanup of wells to the northeast when ground water moves southeasterly. Mr. McMichael based this conclusion on the assumption that PAH movement is negligible. According to McMichael's analysis, any pollutant movement would be to the SE.

New Para Second, Mr. Michael stated that pollutant movement is determined by aqueous solubility (chemical) and particle sorption (physical). Mc Michael proposed that because PAHs are relatively insoluble and particle movement is minimal, the PAH pollutant plume is immobile. He failed to mention the possibility of ~~[illegible]~~ PAH ~~movement~~ migration through a hydrocarbon phase. Hydrocarbon phase movement may occur through two mechanisms — 1) migration of a hydrocarbon plume which more dense or lighter than water (See Figure 1.) and 2) migration of hydrocarbon contaminants through organic material micelles. This latter theory is supported by the available data. U.S. GS has conducted several preliminary pumping tests which will be summarized in the report to be published November, 1980. The data demonstrate that the PAH contaminants move through the aquifer more rapidly than expected from simple diffusion and ~~[illegible]~~ are affected by pumping. Recent data from MDH also support this theory. SLP Well no. 5 (due west of the

006199

Reilly site) recently ~~contained~~ had increased concentrations of PAHs. The hypothesis is that the plume of contaminants is moving toward the well heads being pumped most heavily. These areas are ~~now~~ now in the western hemisphere of SLP because the large production wells of the eastern hemisphere of SLP (SLP wells nos. 4, 7, 9, 10 and 15) have been closed.

ERT suggested ~~localized~~ that other localized sources have caused the PAH contamination of the SLP water supply. Table 4 lists the sources of PAH contamination that ERT presented to us. These sources have been and continue to be investigated by U.S. GS and the Minnesota Pollution Control Agency (MPCA). There is the possibility that some of these companies have joint and severable responsibility with Reilly for causing the contamination of the groundwater of SLP. We believe, as do other experts, that Reilly was the major contributor to the contamination of the groundwater.

ERT suggested peroxide treatment for specific removal of PAHs. The reason ERT selected peroxide treatment were fourfold: 1) cost-effectiveness, 2) specificity, 3) capabilities for intermittent use, and 4) previous effective demonstration. ERT also stated however that direct experimental investigation would be necessary to validate peroxide treatment. We agree that a pilot study will be necessary if peroxide treatment is used.

006200

Peroxide treatment requires a catalyst. This may be iron or ultra-violet radiation (UV). The data presented by ERT, "Removal of Organic Matter from Water by UV and $H_2O_2$", L. Berglind, et al., in EPA-590/9-79-020, ~~[illegible]~~ Oxidation Techniques in Drinking Water Treatment. Drinking Water Pilot Project (1979), was hydrogen peroxide ($H_2O_2$) and UV treatment.

Table 4. Sources of PAH Contamination in SLP

city dumps and land fills (5)
paving and roofing companies (5)
coal and fuel dealers (4)
miscellaneous (5)
- Flame
- D+A Lubricants
- Golden Auto Parts
- Prestolite
- Anchor

rubber manufacturing companies (3)
non-site specific (3)
- septic tanks
- road tars
- railroads

Numbers in parantheses are the number of sources in each category.

ERT failed to mention that UV radiation was used in this study. The 98% destruction efficiency ERT referenced requires a ~~f~~ residence time of four hours with UV radiation plus ~~and~~ $H_2O_2$. Again, iron may be used as a catalyst but the treatment system is experimental for the inlet concentrations typical of SLP and would require a pilot plant study.

There are alternative systems for organic contaminant removal such as carbon adsorption which we feel may ~~warrant~~ need further consideration by Reilly. ERT commented that carbon adsorption was capital intensive and nonspecific for PAH. Calgon has developed an activated carbon which is specific for large organic molecules, such as creosote compounds. The state-of-the-art is more refined than suggested by ERT. Carbon adsorption can be used in a portable system which reduces capital investment. And, the spent carbon can be regenerated and reused. As stated earlier, source removal or isolation and containment may be a cost-effective remedy as opposed to drinking water treatment for a seemingly infinite time period.

Hopefully ~~This~~ the discussion above will clarify the concerns we briefly expressed ~~briefly~~ to you after the Reilly-ERT presentation. If you have any further questions, please do not hesitate to call.

Sincerely -

M. Toepfer

bcc: Leininger
Toepfer
Devlin
Brios

006202

~~Anybody else?~~

cc: Erica Dolgin
Steve Shakman
Rich Ferguson
Alan Hinderacker (sp?)
Dick Koppy

TO: KEN FENNER
FROM: BOB LEININGER
RE: REILLY TAR TRIP TO MINNEAPOLIS 10-8, 10-9
DATE: 10-10-80

Melanie Toepfer was in Minneapolis prior to my arrival since Monday, 10-6, with Dennis Devlin of HQ for the purpose of summarizing the reports and studies which had been carried out by USGS and the State agencies. The agenda for the trip was, on 10-8 to briefly meet w/ the State, then discuss the case separately w/ only Region II and HQ present, then, after lunch to meet w/ the U.S. Attorney, State and Feds. On 10-9 we were all to meet at the U.S. Attorney's office to hear what Reilly Tar had to say.

On 10-8, as stated above, we were met by representatives of the State as well as Marc Hult, the USGS hydrogeologist who has been studying the problem in St. Louis Park caused by Reilly Tar. The State had called the meeting in order to ascertain our position with regard to funding in part, the further work of Marc Hult. Melanie advised Dennis Coyne of the AG's office that we had already thoroughly discussed this matter both w/ the State and USGS. Marc Hult

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responded by stating that he knew what the Region V stance was but that he had yet to receive a commitment from the State. The rest of the meeting involved a discussion between the State and Marc Hult about this matter. (He needs $20,000 from the State, which USGS will match.) The State then left for lunch to allow Melanie and I to talk w/ Frank Bires, Dennis Devlin and Fred Stiehl from HQ.

Melanie and Dennis explained what they had been doing with regard to summarizing and organizing the data so that the U.S. Attorney could follow and understand it. We discussed how it all should be put together as well as the quality of the data from an evidenciary as well as technical standpoint. We also discussed the position which we needed to take w/ the U.S. Attorney. We all were concerned that the meeting w/ Dilly had been set up unilaterally w/out our being consulted by Berg's office. We also felt somewhat in the dark about what Dilly had up its sleeve. Frank Herman (ass't U.S. Atty.) had not been very enlightening in my earlier phone calls w/ him. The bottom line was that we wanted to be sure that

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Berg would not make any concessions to Reilly at the next day's meeting.

After lunch we met w/ Berg and Herman (No one from the State was present.) and I reiterated our concerns about not being kept fully aware of what Berg was planning. He said that Herman couldn't have given me any better information ~~since~~ since he wasn't really sure what Reilly would propose or ask of us. In any case, he agreed that Reilly should do the talking and we could ask them questions about their proposal, but that we would not agree to anything at this time.

At 2:00 that day the State joined us and Berg set forth the events which led to the meeting and his contacts w/ Reilly. The day before filing the lawsuit, as a courtesy, he called Reilly to advise them of it. After the filing Reilly's attorneys asked to meet w/ Berg, so they had a meeting wherein they said they would be willing to provide a "reasonable and significant" effort, but that total cleanup may require more money than Reilly has. They asked to present their proposals to the plaintiffs in the lawsuit.

Meeting With Reilly Tar: 10-9-80

Berg made the opening remarks and also advised that he would not agree to a continuance of the Motion to Intervene of the State and City which is set for today, 10-10.

Ed Schwartzbauer, counsel for Reilly said that he requested that no statements made at the meeting would be used as admissions, and all attorneys agreed. He then outlined the litigation as he saw the issues:

1. RCRA: is it retroactive?
2. Imminent + subst. end. to health: is there really a health risk?
3. PAH's (contaminants): what are the levels?
   - Reilly is only one of 20 potential sources
   - PAH may be ubiquitous
4. Culpability: what did Reilly actually do wrong?
   - City of St. Louis Park accepted responsibility
5. Remedies: they want a rational and practical solution, i.e. "treat the water and leave the contaminant where it is in the ground."

Dr. Francis McMichael from ERT then did the rest of the talking which consisted almost entirely of treatment of the water supply rather than the source as well as his justification for doing so. The main points that he made were:

1. His focus is on PAH's (although other contaminants are in the water).
2. According to the WHO standards, only two of the wells are contaminated and only one aquifer (Prairie du Chien) is a cause for concern.
3. There is little problem w/ migration of the contaminants from the site, and if other wells become contaminated it is probably from "another source" than Reilly
4. On a "worst case basis" people in St. Louis Park drinking the raw water would get more PAH's from food and air than from the water.



It was pretty obvious that Dr. McMichael was playing with the data so that it would add up to what Reilly wanted. He basically ignored the study of Marc Hult which shows

List of Attendees at Meeting at U.S. Attorney's Office on October 9, 1980 - 9:00 a.m.

I. United States Government

Thomas K. Berg
United States Attorney
(612) 332-8961

Francis X. Hermann
Assistant U.S. Attorney
(612) 332-8961

Melanie S. Toepfer
Environmental Scientist
EPA (Chicago)
(312) 353-2110

Robert Leininger
Attorney
EPA (Chicago)
886-6720

Frank Biros
Chemist
Hazardous Waste
EPA (Washington, D.C.)
(202) 426-8710

Dennis Devlin
Tech. Staff (Environmental Eng.)
Washington, D.C.
(202) 472-3500

Fred Stiehl
Attorney
EPA (Washington, D.C.)
(202) 426-8710

II. State of Minnesota

Stephen Shakman
Assistant Attorney General
296-7703

Lovell Richie
MPCA
296-7339

Dennis Coyne
Assistant Attorney General
296-7702

Dr. Roger DeRoos
Minnesota Department of Health
296-5320

Bill Miller
Assistant Attorney General
341-7272 (Rep. MN Dept. Health)

Jay Heffern
MPCA
296-7305

III. St. Louis Park

Dick Koppy
Director of Public Works
920-3000

Allen Hinderaker
St. Louis Park City Attorney
335-9331

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer
Attorney
Dorsey Law Firm
(612) 340-~~2745~~ -2825

William J. Kpeppel
Attorney
Dorsey Law Firm
(612) 340-2745

007281

IV. Reilly Tar and Chemical Corporation - (Continued)

Mr. Polack
General Counsel, Reilly Tar and Chemical Corporation
(317) 638-7531

Dr. Francis Clay McMichael
ERT, Inc.
(412) 261-2910

John C. Craun
ERT, Inc.
(412) 261-2910

Dr. Robert W. Dunlap
ERT, Inc.
(617) 369-8910

List of Attendees at Meeting at U.S. Attorney's Office on October 9, 1980 - 9:00 A.M.

I. United States Government

Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) (Washington, D.C.
Fred Stiehl - Attorney - EPA (Washington, D. C.)

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General
Dr. Roger DeRoos - Minnesota Department of Health
MDH — Bill Miller - Assistant Attorney General
Jay Heffern - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer - Attorney
William Kueppel - Attorney
Mr. Pollack - General Counsel, Reilly Tar and Chemical Corporation
Francis Mr. McMichael - ERT, INC. → tech. analyst
Mr. Craun - ERT, INC.
Mr. Dunlap - ERT, INC.

List of Attend at Meeting at U.S. Atto. y's Office on October ~~9, 1980~~ - 9:00 A.M.
8, 1980

I. United States Government

Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) "

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General
JAY HEFFERN- MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer - Attorney
William Koeppel - Attorney
Mr. Pollack - General Counsel, Reilly Tar and Chemical Corporation
Mr. McMichael - ERT, INC.
Mr. Craun - ERT, INC.
Mr. Dunlop - ERT, INC.

10-9 9:00
Reilly Tar
Minneapolis

Meeting on Reilly Tar
Reilly to bring in ERT and their counsel to have a session whereby they will present the results of their studies and, perhaps set forth in a general way, the type of remedial measures which they feel are needed to clean up the site and/or provide drinking water to the community and whether they would be willing to undertake these tasks.

Opening Remarks : Tom Berg
- N/I can't be postponed

ES:- mixed legal + tech group, but there is a settlement conference so everything here is off the record + not part of or will be used in litigation.
All attorneys agreed.
- outline of litigation as he sees it because of the magnitude of the issues presented for all parties:
① RCRA → health problem (imm + subst. endangm.)
- we'd love to prove but they'd have to spend $ to disprove.
② Has Reilly committed a tort ie. are they in the wrong, culpable ie. old fashioned nuisance law as to Solutec Rec. Case + have to show culpable, strict liab.
③ Is there an imm. or potential threat to public health → subst. divergence of opinion ie may not be carcinogenic + may be anti-carcinogenic
Can Reilly spend $ on the solution or on the fight.
④ What levels of PAH's
- 20 potential sources
- Dr. Fran McMichael will talk on this
- may be ubiquitous
- MN is the Saudi Arabia of peat

007285

1. Do you have an opinion as to which wells if any would need to be treated.

2. Would the transport of chemicals over time cause other wells to have to be treated.

#5 + 10 are only wells > WHO standards
If other wells were, in time, contaminated he would suspect another point source since the migration of these is so slow.

Benzo(a)pyrene

FB - the WHO standard of 200 ppt is based upon the 6 cmpds (PAH) selected for monitoring, but not necessarily the 6 worst

DrMcM - some of the other 15 cmpds are also carcinogenic

TB → We will get back to Rilly by the middle of next week

007286

Reilly Tar
co/a
121

⑤ Retroactivity:
- Judge Kane of Hennepin Cty said "when did the damage occur?"

⑥ City of S.L.P.
- Reilly is convinced that the City was trying to get rid of Reilly due to air, water & gas pollution problems since 1930's

⑦ Remedies
- excavate much of SLP w/ MSH says may cost $100 million
- barrier walls: unpredictable consequences to water tables & soils

Prior to this time ... no problem proposal because they perceived that the State was rigidly wed to excavation & barrier wall w/ one mind boggling & prohibitive i.e. why bother.

Their engineers have said that a solution to the problem may exist, ∴ they should test it & sell it, ∴ identify it, monitor it, leave it in place.

They want a rational & practical result.

They feel no culpability or no health problem.

They are "fighters" but want to resolve this & want to spend significant $ on solutions rather than a law suit of very great magnitude.

Tom Berg ⇒ Response to ES
- helpful & pleased to hear him say a significant & reasonable effort
- EPA proposal is generally to "clean up" the problem & we are somewhat skeptical but look forward to hearing what Reilly has in mind.

007287

Reilly Tar
10/9
131

DR. McMICHAEL

- general idea of people is removal of source, but he will address another view + will talk about treatment of the water supply + explain alternative, more cost effective + expedient solutions ~~to get~~
- focus will be on PAH's:
these are found in the water supply but not at high levels everywhere.
3 aquifers: shallow, middle + deep
PAH is in the Prairie Du Chien - Jordan aquifer wh is the 1° source of supply to the City.
- Displayed table wh lists the quantities of water taken from the SLP wells wh are grouped from the aquifers wh they were taken from.
they're all ~ the same size w/re to pumpage ability but they're used to different degrees, eg. 5 PDC wells were shut down due to MDH data on PAH's in the wells.
At present, MDH or SLP's only alternatives have been to shut down wells ∴ SLP system can't meet demand in summer, esp. in Summer of '80
had to had have a lawn sprinkling ban.
SLP runs wells in response to demand rather than pump, store + disperse
All water is from g.w. of high quality
ie, in general, the supply has a limited # but well defined problems.
- treatment of a number of wells in clusters
- they now 1° treat to ↓ Fe in g. water to

007288

10-9
Reilly Tar
(4)

improve taste, avoid staining + avoid deposits on pipes → pump out, aerate to ↑ pH + precipitate it out + filter it out
- also pre-filter $Cl^{\ominus}$ to aid Fe removal + post filter $Cl^{\ominus}$ for bact. removal + prevention down the line. Not used for bact. removal but to aid Fe removal. Also $F^{\ominus}$ addition
- Info. on display based on data from 3 state agencies w/ [PAH] in ppt or nanograms/l
- highs concn on #10 + 15 ~ 4500 - 5000 ppt in total PAH's (11-21 chem. analyzed for + total is the cumulative sum). Used to get an ordering of the problem, eg #6 is 8 - 120 ppt + others are < 180 ppt + may be as low as 1 ppt
- WHO has identified 6 specific PAH cmpds + it is ∴ more useful to use these to see wh PAH's we're talking about.
eg. #10 + 15 → 900 - 1200 ppt
↓
- 880 ppt based alg on WHO list
- problem is in PDC aquifer + esp. in 2 wells: 10 + 15

007289

# PAH's + well data discussed

21 cmpds found in SCP water supply
Look at molecular structures, ie >1 benzene ring (2-6 ring cmpds)
- they behave in chem-phys, or biol. systems & can be grouped
- NAS is Nat'l Academy of Science
- NAS has labeled these cmpds as to their impact or biological effect.
- 5 ring cmpds are 1° carcinogenic, eg. benzene pyrene (BAP) wh is the worst or "signal" material based upon NAS list.
- not all on WHO list are carcinogenic wh concentrates on 4, 5, + 6 ring cmpds, 3 of wh are 5 ring cmpds.

Display #2 is a bar graph w/ 5 bars over each cmpd wh represent the 5 SCP wells that are closed (15, 10, 4, 7, 9 ?)
- 2 wells > WHO standard for flouranthene, wh isn't listed as a carcinogen
- WHO standard is violated if >200 w/ any one or any total of the six or less
* for 2 wells (15 + 10)

007290

co-9
Reilly Tar
(5)

[ Worst Case Exposure to Raw Water from Well 15

- Compare to food (µg/day) 1.6 + 16 µg/day
  2l of well 15 well water also is this level
- Ambient air + cigarettes also compared
- benzo(a)pyrene levels for well 15 is 2+20 times lower than food (cooked, barbecues)

The above is meant to put the problem into perspective.

Display #3
Made Materials other than creosote: asphalt, commercial oil + "clean" peat

Display #4
- potential sources of PAH's
- 25 specific, e.g. dumps + landfills
  coal + fuel oil boilers
  rubber dealers
  misc. industrials
  non-point sources
  - RR bins + yards, septic tanks, farming operations
- SCP was + is an industrial center

Display #5
- map of "other sources" which are atmospheric

What is a significant source?

- a single well w/ 1ppb → 5 lbs of material in a yr.

007291

10-9
Reilly Tar
/6/

TREATMENT OPTIONS

- we want standards to 10-1
Display #6
- Basu + Saxina were paid by EPA to examine levels of PAH's in raw + treated water in various locations in U.S.
- highest levels were found in ppt in Phil. + PiHs. Wh are ~ raw waters for SLP + generally are worse than SLP. Treatment trains are ~ SS, dissolved substances (Fe), removing hardness + pathogens. All use carbon. 98-99% success in PiHs + high 90's for Phil. ∴ treatment works and are at levels ~ that of the Twin Cities
- MDH checked 2½ g/m/ft² pressure sand filtration → 84% reduction of fluoranthrene.
1050
- add powdered activated carbon
- PAH's are hydrophobic by many factors of 10 ∴ Fe flock + powdered activated carbon, plus sand filtration, will work

Chemical Oxidation w/ $H_2O_2$ for organics removal (used in coke plants) (Midland, Pa.)
- advantages:
cheap because you use a pipe, tank, etc w/ enough size + resonance time
- German study on $H_2O_2$ used for benz(a)pyrene + w/ waters wh have other organics in it as w/ SLP waters
- can be adjusted ~ to [PAH in water] + can be turned on + off + can also be used to change ferrous Fe to ferric Fe for flock removal w/ sand filtration

D-9
Reilyton
(7)

Movement of PAH's

- PAH's are slightly soluble but readily adsorbed onto mobile material
  2 rings are more soluble 1 mg/liter
  5 " " less " 1 µg/l
- adsorption reactions happens readily & definitely w/in the resonance times they have w/the soil particles
- rate of transport of PAH's

Display #8
- graph w/ 1 → 1000 ppm on axis
  1 → 1000 retardation on abscissa
- retardation through organic soil is much greater than w/ sandstone
- high concentrations will be found near the source

ES

- Real world presentation
- look to multiple sources
- if excavation was done, what good would it do?
- if fed + state agree that treatment is the solution, not only will they share documents, but they will work in good faith partnership on this w/us
- He'd like to hear from us

FB → we need to talk about this among ourselves, but this is only a part of the problem + there's a long way to go.

007293

Jesse Cowen / MERL
carbon absorption expert
8-684-7671

Roy Murphy / HWTF hydrogeologist
8 382-3120

Likely expert witness for analytical methods:

Barry E. North, PhD, MPH
w/ Fred C. Hart Assoc
Denver (303) 234-2683

works as a consultant for NEIC for lab procedures.

ENVIRONMENTAL PROTECTION AGENCY

REGION V

ENFORCEMENT DIVISION

TELEPHONE MEMO

TO: Eunice Sigmdson 8-776-5216

DATE: 9/5/80

FROM: M. Toepfer

TIME: 10^00 AM

SUBJECT: MDH Risk Assessment

SUMMARY:

2 possible health effects experts:

Cancer epidemiologists: Dr. Leonard Schuman
U of MN
Director, Division of Epidemiology
School of Public Health
1325 Mayo Building
Minneapolis, Minnesota 55455

Dr. Abraham Lilienfeld
Johns Hopkins University
(301) 955-5000
(breast cancer)

006288

Consent Decree NRDC v. Train

Eunice Sigmdson 8-776-5216

cancer - excess in women, SLP,

did quick case-control study

cancer cases in SLP v. women cancer in remainder metro area

need 3rd National Cancer Survey

interviewed SLP

+ metro area

risk factors for breast cancer v. PAH in water

beginning analysis now

but preliminarily looks like risk factors to breast cancer will cloud any significance of water risk

Lee McBabe, Bob Naday - EPA, Cincinnati

Bernie Daniels didn't like study above

planning a multiple control study

Cancer epidemiologist Dr. Leonard Schuman

U of MN - not in country right now

(612) 373-8029

Director, Division of Epi

SPH 1325 Mayo Building

Minn MN 55455

006289

cancer epidemiologist - Dr. Abraham Lilienfeld

Johns Hopkins University

(301) 955-5000

breast cancer

Chemical Engineer

Warren Thompson 8-601-325-2116
Mississippi State University
Starkeville, Miss.

006285

Possible Experts

Soil Scientist

Bob Griffin, Ph.D. FTS 955-4200 MT called him in 3/81
U of Illinois / IGS (217) 344-1481
contract officer - Mike Roullier, Cincinnati

PAH adsorption on peat

Hydrogeologists

Olaf Pfannkuch, Prof. U of MN
subcontracted to USGS presently (soil sorption study - column)
very little time, very competent
experience w/ SLP problem for years
taught M. Hult, M. Convery, + R. Ferguson

Bob Kadwell, STS (soil testing services) Minneapolis, MN
(I don't trust him -- MT -- his sentiments are w/ the other side)

Tom Prickett or Bill Walton (former prof. at U of MN)
Camp, Dresser + McGee Chicago / Milwaukee
recommended by M. Hult

PAH - WQC
Charlinga Hiermoff 8-245-3039

006286

Carbon adsorption
Joe Lafornara, EPA, Edison, NJ 8-340-6741

Possible Toxicologists

James Selkirk — Oakridge National Lab, TN

Steven Hecht — Naylor-Dana Institute
Valhela, NY

Harry Gilbom

NEIHS — John R. Bend
R. Smith

Markofsky — U of Cincinnati, College of Med, Dept. EH
1979 vol. PAH (513) 872-5491

Ray Schoenfelt
National Cancer for Tox Research
vol. 3 Carcinogenesis

M J Suess

M. Blumer — Scientific Amer. 234 p. 34-35 1975
"Polycyclic Aromatic Compounds in Nature"
Science 188 p. 53-55 1975
"Polynuclear Aromatic ~~Compou~~ Hydrocarbons in Soils & Recent Sediments"

006287

are they valid methods

1. ~~Gibb method~~ } analytical methods used in 1933 + 1938
~~Chapin method~~ }
2. ~~[illegible]~~ other sources (companies) → old Robinson Rubber Co.
3. " " (generally) peat bogs
4. his expertise w/re to hydrogeology, geology, hydrology → - education - experience
5. McLellan 1940 said well water not drunk (p. 2)
6. W-23 contaminated to 226 ft level w/ tar
   - wh plant personnel said it #39 MN
   - on what basis
   - when was this
7. page 2 → ~~why~~ what does this mean
8. page 7 → why were they abandoned
9. discussions w/ other Reilly Tar employees for information
   - filling in of ~~d~~ W-23 w/ gravel
   - plugging
   - sampling
   - tar in well
10. Have you ever spoken w/ Marc Hult of the USGS? Anyone else at USGS
11. Have you read any articles or documents prepared by USGS? which ones?
12. Have you done any research w/ regard to polynuclear aromatic hydrocarbons? Any one else for Reilly Tar? What?

120A - MN [redacted]

Dice St Louis Park

Depth of Well 90'

Static level 48'

Draw Down 5'

Pumping Approx 150 gal per min.

Size of Well 12"

Air Lift 1½" pipe 120' long

Pumping @ 45# Pressure.

1½ Pipe inside of 4" Pipe

Opr Pressure 60#

Water Temp 50°

108251

INTER-OFFICE CORRESPONDENCE

US 32

PLANT

DATE July 20th 1938

Mr Harkins
Harry & I would like to discuss this with you
Mac 7/20

TO:

FROM:

SUBJECT:

General analysis of water taken from ditch at point where it leaves property at Walker St.

Work done on composite sample obtained by collecting a sample each day for 6 days.

Samples collected during period from July 11th to July 16th.

Sample No. 1

This sample taken from first 3 inches of surface water

appearance: Turbid - Medium Dark Tan Color
Traces of Oil & Tar present:

302996

Specific Gravity - @ 60°F - 1.004
Total Solids - by evaporation - 0.2%
Phenols - (Chapin Method). 1: 16000 approx.

Barium Chloride when added produced a white precipitate of Barium Sulphate, insoluble in Hydrochloric acid - indicating the presence of

INTER-OFFICE CORRESPONDENCE

PLANT

DATE

TO:

FROM:

SUBJECT: Sodium Sulphate.

## Sample No. 2

This sample was collected in the same way as sample No. 1 except that it was obtained from bottom of ditch and included the material found on the bed of ditch.

### Appearance

The bottom of ditch was found to have a layer of tar spread out quite uniformly from 3 to 4 inches deep in the sand of the ditch bed. The water flowing over the bed was found to be the same as in sample No. 1. Therefore, except for the larger amount of tar and only matter this sample was about the same as sample No. 1

302937

INTER-OFFICE CORRESPONDENCE

PLANT

DATE

TO:

FROM:

SUBJECT:

General:

The above description of this water, can be regarded only as approximate. The quantities of the various substances contained in this water are in such minute proportions that only laboratories equipped for this class of analytical work can handle with any degree of accuracy.

The Specific Gravity of 1.004 @ 60°F indicates a slightly higher reading than pure water. This can be explained from the fact that Sulphate water from by-product and boiler blow off is present.

The water showed total solids by evaporation of .270 which is about half the amount found in McKeesport analysis.

302998

The phenol content which was determined by the Chapin method, is adapted to steels involving larger quantities of phenol

INTER-OFFICE CORRESPONDENCE

PLANT

DATE

TO:

FROM:

SUBJECT:

such as found in coal tar dips and cresals. Therefore the ratio of 1 in 16000 is only approximate. The test, however, very definitely shows up the presence of phenol even in very small traces, by the red color which develops when treated with Millons reagent.

The presence of Sodium Sulphate can be determined by the addition of Barium Chloride to its aqueous solution. A white precipitate of Barium Sulphate forms, which is insoluble in Hydrochloric acid.

302999

During the week the samples were being taken, the by-products was in full operation, Carbolates were being sprung every day, resulting in large volumes of sulphate water going to the ditch. No water from benzole tank was released to ditch during this time.

UNDEN

PLANT

DATE

(1)

TO:

FROM:

SUBJECT:

(a) The water and liquor are stored in ground tanks having capacity of 13000 gallons where it is allowed to settle for proper separation. When ground tanks are full the liquor is pumped out to storage and the water to ditch. Our average operation schedule based on three stills runs per week will produce approximately 4800 gallons of this water per month. The average production being 100 gallons per still, four stills operated 3 times per week yields 1200 gallons per week, or 4800 per month.

(B) The material referred to here is the 303000 emulsion formed in extracting tar acid from oil with caustic soda. There is very little of this emulsion which cannot be separated into carbolate and oil. The emulsion is placed in storage tanks where heating and settling over a period of time results in recovery of the oil and carbolate, occasionally there is a layer between the carbolate and oil which will not break

INTER-OFFICE CORRESPONDENCE

PLANT

(2)

DATE

TO:

FROM:

SUBJECT:

up. This portion is set aside and used for weed killing around the plant, and will amount to about 600 gallons per month. None of this material goes to the ditch.

(C) The figure suggested of 6000 gallons waste material entering the ditch per week we think is high. Our normal operating schedule will produce about 2000 gallons sulphate water from tar acid sprinkling and 1200 gallons from Benzole tank, will bring the amount per week between 3000 to 4000 gallons. We do not believe the amount will ever exceed 4000 gallons.

303001

(D) The fact that this sample contained 25% settleable oil indicate that it was not representative of the material entering the ditch. Only the oil free water is pumped to ditch, and will contain only traces of oil. The only phenols and Cresols present would be the amounts soluble

INTER-OFFICE CORRESPONDENCE

(3)

PLANT

DATE

TO:

FROM:

SUBJECT:

to produce a saturated solution, this is generally recognized as being 1 in 15 or 6.67% on phenols, while cresols are soluble to the extent of 1 in 50 or 2%.

(E)

Analysis indicates sample was not representative. The fact that 25% tar acid was found, shows analysis was made on the oil, as the water could not contain the amount of tar acids.

303002

11-19-80

Reilly Tar Consent Decree

Surface
- studies done on feasibility of bldgs on
-

USGS project proposal is to be redrafted + finalized by this Friday.
We find:
1.) smaller of 40 samples
2.) ~~characterization of waste + bad for all~~
characterization of waste
- so lets ask them to keep it confidential

Sickok
- has completed almost the carbon studies
- series of short papers on remedies:
eg. excavation → cost, feasibility
- 2 contacts
- w/ City for water treatment
- w/ MDH

Water Treatment Monitoring of Drinking Water Supply

- water quality criterion is 2.8 ppt (ng/l)
- monitor all drinking water wells + if > 2.8 ppt then treat
- all municipal + private wells used for human consumption by St. L. Park +

004261

Immediate ~~site~~ Cleanup Requirements

#23
- remove all contamination + seal off the well
- well ~~abandonment~~ cleanup, rehabilitation or proper closure for multi-aquifer wells wh are known to be leaking
- test all + then properly abandon or rehab

MST

1. Maintenance of Drinking water Supply
2. Disposal Report
3. Immediate Remedial Measures

   W-23

   other multi aquifer wells
4. Soil Cleanup
5. Aquifer Cleanup
6. Well Field Management Plan

INSERT #2

- There is a good biological plausibility for the hypothesis of the proposed study. Oral administration to female rats of certain constituents of coal tar have produced mammary tumors. It is unknown, however, if the same effect would be produced in humans, or what effect the other constituents of coal tar may have on such a response. Again the levels of coal tar constituents in the St. Louis Park water supply may be inconsequential.

- A pathologist at the University of Minnesota found significantly elevated incidences of certain histologic findings for the breast cancer cases in St. Louis Park compared to breast cancer cases for Minneapolis-St. Paul area. Here again, however, an association between the peculiar histologic findings and the contaminated drinking water cannot, at this time, be demonstrated.

- There is a dearth of knowledge on the effects of human ingestion of polycyclic aromatic hydrocarbon mixtures such as coal tar. Our knowledge regarding the health effects from other dump sites involving coal tar, petroleum products, creosote, etc. could greatly benefit from the information provided by this study.

- The dump site had been contaminating the water supply ~~since~~ perhaps as early as 1917 and at least as early as 1930s. Thus the endangerment has already occurred and future endangerment is not likely to be as serious as the current problem.

| | OPTION 1 | | OPTION 2 | | OPTION 3 | |
|---|---|---|---|---|---|---|
| | CAP | ANNUAL | CAP | ANNUAL | CAP | ANNUAL |
| Treat Water Supply | 1,761,000 | 231,000 | 913,000 | 265,000 | 720,000 | 90,000 |
| Seal Waters or Connect to Maintenance | 49,000 | | | | | |
| | 109,000 | | | | | |

Treat Water Supply : Cost of tieing in with another city?

Contaminated Earth : Land Farm in place?

Barrier Wells : Are all 5 necessary

Equalizing only & surcharge to POTW

Why is industrial surcharge necessary?