Potential Comb. R.A
- Sabine - existing ISC model on server (zip.) under mulkooDJ (report, files in folder)
*will need precip data if we do it
- Victoria - no previous modeling

Wuks

1) Consent Order sub. Dec 2001 ⇒ Final model report 4-17-02
- Deposition to Little Hocking
- Ambient Air (max)

MET with stats & made menu changes
- added emissions pts / made no diff
- imported terrain data differently

2) Second modeling run

3) 2002/2003 projected emissions

If Rob wants 2003 dep.
1) Go to 2000 LAKES & modify emissions, stack parameters & check inputs } either or
2) Import trinity (Actual 03 r 2) into Lakes & re-order scav. coeff

E-4F REV 6/93

ENGINEERING DUPONT COMPUTATION SHEET

SHEET NO. ______

TITLE OF PROJ. OR STUDY ______ PROJ. OR STUDY NO. ______

SUBJECT ______ WORK ______

______ COMPUTER ______ DATE ______

Circleville

Deciding ~~whether~~ on whether or not to sample outfall for APFO.

Before they do that, can we infer levels?

what "raw material" do you get from WW?

~~How much in it~~
How is it processed?
heated up

Outfall conc?

Vent/air emiss. conc.?

B 9432

Dispersion → teflon fiber manuf. process → small vol WW → Central WWTP

characterized for C8 conc to River not significant discussed w/ EPA

(Annette)
Environ prelim -
risk higher for taking to landfill vs in place
• BR
• CI

~~waiving~~
Results OK for moving material

~~Gregg Martin~~
~~↳ should have what he needs by meeting next week~~

USE STANDARDS FOR MINIMUM ESSENTIAL INSTALLATIONS

CAB000013

EID546862

Restate Objective

✓ - look ~~@ gw &~~ @ ~~[illegible]~~ completed conc. of ~~CE~~

in gw & air & sw → compare CEGA

CLCW

Fish ingestion

~~Legal Update~~

"Rules of Game"

COOLING TOWER

By SUMP By DV-3

✓ Technical efforts/inputs

Contributions to SW

- outfall
- (5) stripper discharge
- ~~runoff (not included)~~

Ambient temp

8000 ft3/min

(SATURATED AIR)

Contribute to ambient air

Stack(s)

Contrib to gw

- SOUTH LAGOON
- "SUMP" & underground piping
- (wet deposition from air) ?

CRAIG

KEN

JIM

FRANK

"Mike"

INPUTS FOR MODELING

SAMPLES

- lagoon [illegible]
- sump
- stripper

ANALYT/LAB

- Exogen (Andrew Hartten)

Polyethylene

PLOT PLANS

stack height, diameter
flowrate
temp

Plot plan

1) Building heights
- 500m

2) Stack location
3) Plant boundary
Coord sys/scale

CAB000032

EID546881

CAB
Cville

OUTFALL | $30 \mu g/l$ in 2.3 - 2.6 MGD

River: Harmonic Hk = 737 ft^3/s = 1.8×10^9 l/day
7Q10 = 170.5 $\frac{ft^3}{s}$ = $4.17 \times 10^8 \frac{l}{day}$

2.6 MGD $\boxed{2001}$
9842071 l/day
2.3 MGD 20

(1) $2.6 \times 10^6 \frac{gal}{day} = 9842071 \frac{liters}{day}$ Cville ww flow in 2001

(2) $30 \mu g/l \times 9842071 \frac{l}{day} = 2.95 \times 10^8 \frac{\mu g}{day}$ in ww

(3) ⓐ $170.5 \frac{ft^3}{s} = 4.17 \times 10^8 \frac{l}{day}$ → Sciotto R. 7Q10

ⓑ $737\ ft^3/s = 1.8 \times 10^9\ l/day$ → Sciotto R Harmonic Mean

(4) $2.95 \times 10^8 \frac{\mu g}{day} \times \frac{day}{4.17 \times 10^8\ l} = 0.7 \frac{\mu g}{l}$ } using 7Q10

*(5) $2.95 \times 10^8\ \mu g/day \times \frac{day}{1.8 \times 10^9\ l} = 0.17 \frac{\mu g}{l}$ } using Harmonic Mean flow

Key Assumptions
- 25% or less goes to ww ($30\ \mu g/l$ is good #)
- ww flow is 2.6 MGD or less
- Harmonic mean flow most appr (long-t. exp)

Key Question: do we need to think about air?
do we need to do anything further w/ water?

CAB000070

EID546919

WVWks ~~E~~ Exposure anal

max vapor conc = — µg/m³ ⇒ inhal dose

little flocking water conc. max. 2 µg/L ⇒ dw dose

ohio river fishing ⇒ rec fishermen ⇒ fish ingest.

↳ ~ 4 wks ohio river data
BCF of 9.4

(~~tom~~ backyard produce sample)

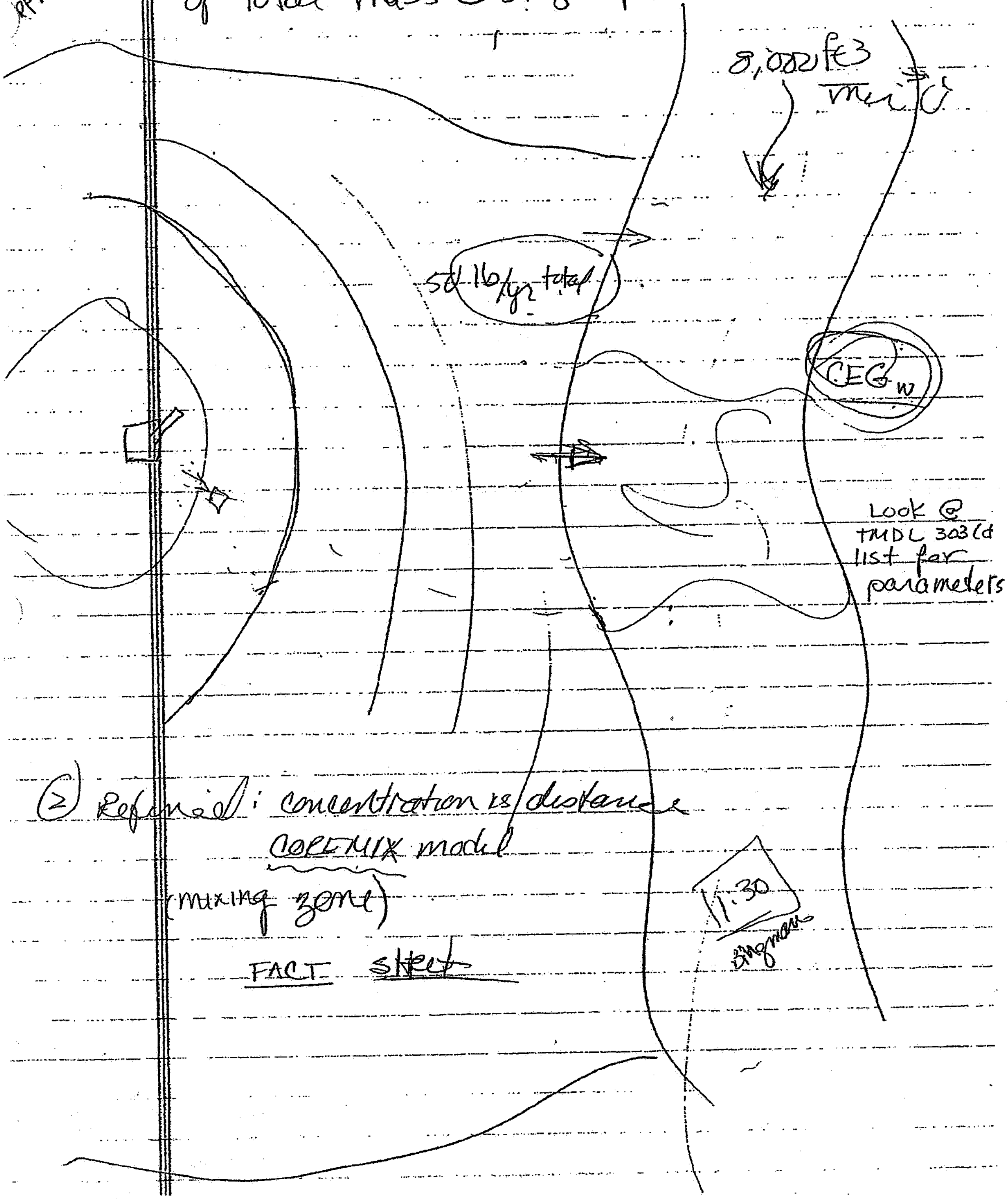
comparison w/ 2 µg/kg/day = allowable dose/conc.

CAB000156

EID547005

see approach

(1) ~~WORST~~ BEST-CASE = assume complete mixing of total mass @ single pt



(2) Refined: concentration vs distance
CORMIX model
(mixing zone)

FACT sheet

Assumptions

- Air emission rate = 0.07 g/sec emission rate
- 5 kilometers in each direction of source = watershed boundaries
- Cape Fear River is receptor
- Treat as a single point discharge with complete mixing (OK because drinking water receptors far downstream)
- Surface area of water body small compared with watershed area
- CEGw = 1 ug/L

5K

mass bal
① ~~sedim~~ material
② wetlands

AVERAGE CONDITIONS

10K

.007

Total Deposition To Watershed

0.00154

- Average wet and dry deposition rates for particles = ~~0.0033~~ s/m2-yr
- ~~Average wet deposition from vapor phase = 0.0026 s/m2-yr~~
- Total deposition = ~~0.0059 s/m2~~-yr x 0.07 g/s = 0.000413 g/m2-yr

.00154 1.078×10^{-4} g/m²/yr

Load to River

- Load to river = deposition per square meter x watershed area
- L = (0.000413 g/m2-yr) x (118 E6 square meters) = 48,734 g/yr

20,886

Concentration in River

- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per ~~day~~ year
- 48,734 g/yr x 1/ 456E10 = 1.07 E-8 g/l = **0.0107 ug/L**

= .039

4.6×10^{-3} ug/L

MAXIMUM CONDITIONS

Total Deposition To Watershed

- Max wet and dry deposition rates for particles = 0.216 s/m2-yr
- Average wet deposition from vapor phase = 0.2 s/m2-yr
- Total deposition =0.416 s/m2-yr x 0.07 g/s = 0.029 g/m2-yr

Load to River

- Load to river = deposition per square meter x watershed area
- L = (0.029 g/m2-yr) x (118 E6 square meters) = 3,422,000 g/yr

Concentration in River

- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per day
- 3,422,000 g/yr x 1/ 456E10 = 7.5 E-7 g/l = **0.75 ug/L**

based on CEGw of 2 l/d x 1 ug/L

730 ug/yr ⇒ OKAY DOSE

CAB000237

EID547086

$BCF = 10\ ^{L}/_{kg}$

$C_{fish} = (.004\ ^{\mu g}/_{L}) \times (10\ ^{L}/_{kg})$

$= .004 \times 10^{-3}\ \frac{mg}{L} \times 10\ ^{L}/_{kg} =$

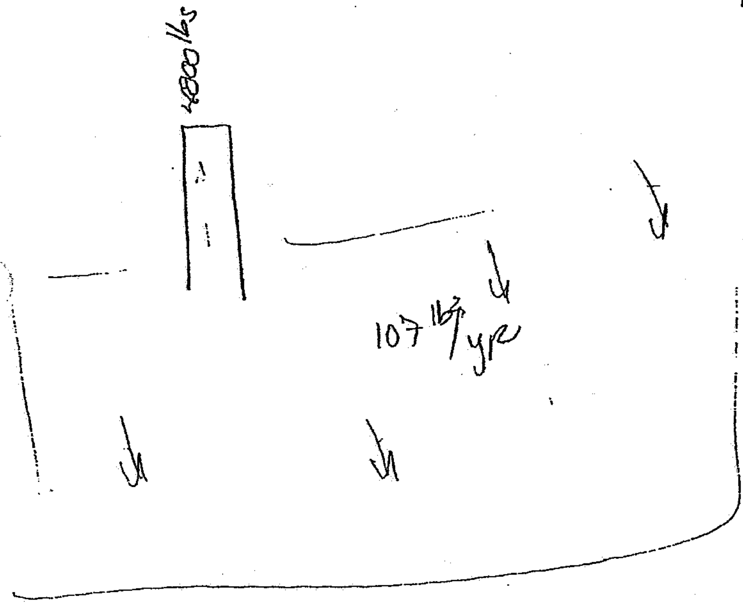
$\boxed{4 \times 10^{-5}\ ^{mg}/_{kg}}$

$\frac{\mu g}{L} \times \frac{}{10^3 \mu g}$

* look up fy

$\frac{4700}{365}$

4700 lbs/yr



$4 \times 10^{-5}\ \frac{mg}{Kg} \times$

Modeling

- On-site population vs ~~[illegible]~~ AEL
- off-site popul. vs CEG
  - ~~[illegible]~~ ~~[illegible]~~ max exp vs CEG

end product / comm exp

- Emiss ~~estimate~~ RATE @ max receptor to meet CEG; 1/2 CEG, ~~[illegible]~~ 0.1 CEG, 0.01 CEG.
- Emiss rate ~~[illegible]~~ onsite exposure emissions rat to meet AEL...

$$1\frac{g}{s} \times \frac{lb}{454g} \times \frac{60s}{min} \times \frac{60min}{hr} \times \frac{24hr}{d} \times \frac{365d}{yr}$$

431 g/mole

EFAST → indirect

- Square foot for dry + wet deposition?
- ~~ann~~ annual average ~~conc~~ g/m²-year
- calc total annual mass to Cape F. River
- Q: 1.25×10^4 MLD (million liters/day)
- CEC_w 1 ppb ($1 \mu g/L$)

$$\frac{1 \mu g}{L} \times \frac{1.25 \times 10^{10} L}{d} =$$

1.

$$\frac{1.25 \times 10^{10} g}{454 g} \ lb$$

$$\cancel{1 \times 10^{-6}}$$

$$1.25 \times 10^{10} \frac{L}{d} \times \frac{1 \times 10^{-9} g}{L} \quad 12.5 \ g/d$$

$$\cancel{\frac{1 \times 10^{-6} g}{L}}$$

$$\frac{10^{-6} g}{L} \times \frac{1.25 \times 10^{10} L}{d} \times \frac{lb}{454 g} = \frac{1.25 \times 10^4}{454} = \boxed{27.5 \frac{lb}{d}}$$

CAB000240

EID547089

CEG = 0.3 ug/m3

	(g/s) RELEASE RATE	(SCFM) FLOW	(FT) STACK HEIGHT	(FT) BUILDING HT	(ug/m3) MAX CONC.
	1	10,000	110'	100'	0.77
	1	"	110'	60'	0.54 ↑
	1	"	90'	60'	0.92 ↑
1 **	0.07*	"	90'	60'	.064 0.012
→ 2 **	0.07	5,000	90'	60'	.119 0.024
3 **	.07	15,000	90'	60'	.035 0.008

* .07 g/s = 5000 lb/yr

** PLOTS NEEDED

CAB000241

EID547090

1999 particle dep max = 0.2 0.26
conc " = 1.8

$\frac{s}{m^2\text{-year}} \times \frac{g}{s} = \frac{g}{m^2\text{-yr}}$

$\frac{sec}{m^2\text{-yr}} \times \frac{g}{s} \times m^2 = \frac{g}{yr}$

.00326605 = wet + dry dep ⇒ particle
.00326605 = wet + dry dep p.b.
.0026205 = avg wet deposition - vapor
watershed area = 118,774,58 4 m^2 ≈ 118,800,000 m^2
$118 \times 10^6 m^2$

Watershed: average vapor phase conc = 1.7 ug-s/g-m^3
wet + dry particle phase dep = 0.2169
particle-bd dep = 0.2169
wet deposition - Vapor phase = 0.20084
.6338 g/m²yr

$\pi r^2 = \pi(2.5)^2$

118,774,584 m^2 (~5 km)

MAX LOC
X Y
697508 3859025

yearly conc max
1.67 pb p

dep
dry dep = .0159
part wet dep .28
part bd .28

.28
.28
.2

www.training.ibm.com/ibmedu/vap .2

CAB000242

EID547091

$.6338 \frac{g}{m^2\text{-}yr} \times \frac{.079}{s} \times 10.95 \times 10^6 m^2$

maximum point for dep

~~697500~~ ~~385,7725~~ ~~385,7828~~

$= 485{,}808\ g/yr$

weighted total deposition

.2165

.2165

.2008

$0.6338 \frac{g}{m^2\text{-}yr}$

WS = 3KM

weighted total area $= 118 \times 10^6 m^2$

assume emissions $= .07\ g/s$

$\left(.6338 \frac{g}{m^2\text{-}yr}\right) \times \left(.079\ g/s\right) \times \left(118 \times 10^6 \frac{m^2}{s}\right)$

4583.9 area

18 = area

"receiving fallout"

$5444 \times 2350 = 12{,}793{,}400$

1000

km^2

$10{,}953{,}718 m^2$

www.training.ibm.com/ibmedu

CAB000243

EID547092

WORST CASE

MAXIMUM Particle deposition

$= .416 \frac{g}{m^2\text{-yR}}$ [wet & dry particle / wet vapor DEP]

$.416 \frac{g}{m^2\text{-yR}} \times .07\ g/g = 0.029 \frac{g}{m^2\text{-yR}}$

$.029 \frac{g}{m^2\text{-yR}} \times 118 \times 10^6\ m^2 = 3,422,000\ g/yR$

$$\frac{3,422,000\ g/yR}{456 \times 10^{10}\ L/yR} = 7.5 \times 10^{-7} \frac{g}{L}$$

$$7.5 \times 10^{-7} \frac{g}{L} \times \frac{10^6\ \mu g}{1\ g} = \boxed{0.75\ \mu g/L}$$

max conc
mean flow

CAB000244

EID547093

Mean stream flow $= 1.25\times10^{4}$ MLD $= 1.25\times10^{10}\ \frac{L}{D}$
$= 456\times10^{10}$ L/yr
$= \cancel{4,562,500}$

5K watershed

$Cywv = .077\ \mu g\text{-}s/g\text{-}m^3 = .077\times10^{-3}\ mg\text{-}s/g\text{-}m^3$

$Dytwp = .0033\ g/m^2\text{-}yr = (Dydp + Dywp)$

wet + dry particle phase dep

$Dywwv$ = avg wet dep from vapor phase
$= .0026\ g/m^2\text{-}yr$

$F_v = 0$ (WORST CASE)

$D_s = 0.0026 + .0033 = .0059\ g/m^2\text{-}yr$

$.0059\ \frac{g}{m^2\text{-}yr} \times .07\ \frac{g}{g} = \boxed{.000413\ \frac{g}{m^2\text{-}yr}}$

~~$F_v = .5$~~

~~$D_s =$~~

LOAD TO WATER $= \boxed{.000413\ \frac{g}{m^2\text{-}yr} \times \text{AREA OF WATERSHED}}$

$.000413\ \frac{g}{m^2\text{-}yr} \times 118\times10^{6}\ m^2 = 48,734\ \frac{g}{yr}$

$48,734\ \frac{g}{yr} \times \frac{yr}{456\times10^{10}\ L} = 1.07\times10^{-8}\ \frac{g}{L}$

$1.07\times10^{-8}\ g/L \times \frac{10^6\ \mu g}{1\ g} = \boxed{1.07\times10^{-2}\ \mu g/L}$ avg conc @ mean flow

CAB000245

EID547094

www.epa.gov/ttnatw01/112nmerc/NOPR 1915 → Partic(.
WTI Incinerator

On disp. mod

① Guidelines on Air Quality Models (GAQM)
(40 CFR Part 51 App W)
② epa.gov/scram001/index.htm

✱ EPA 454/B-95-003a Sept 95
User's Guide for the ISC3 Dispersion Models, Vol I & II

COPC emissions to environ occur in either vapor or particle phase
F_v (fraction in vapor phase, App 3) <0.05 ⇒ assume only particle phase

Organics occur as only vapor (F_v = 1.0)
or w/ portion on particulates = semivolatile
(particle bound = semivolatile compd volatilize @ high temp & condenses on surface of particles)

METAL
LOW VOL ORG (F_v <0.05) } = $\boxed{\text{particles}}$
SEMI-VOL ORG – (VAPOR) + Part. bd.
ORGANIC (F_v=1.0) – VAPOR

✱ See pg 53 for averaging comment

ISC output
- one-hr average results using max value for all hours of results during a yr for each node
- annual avg results for each node

Cl went D_{ywv} = yearly ave wet dep from vapor
D_{ydp} = " " dry dep from particle
D_{ywp} wet " " "

✱ D_{ywv} "
D_{ytwp} = wet + dry from part

yearly wet dep for vapor
yearly avg conc...

CAB000246

EID547095

FiO_2 452009 = JV

Modeling

· concentration

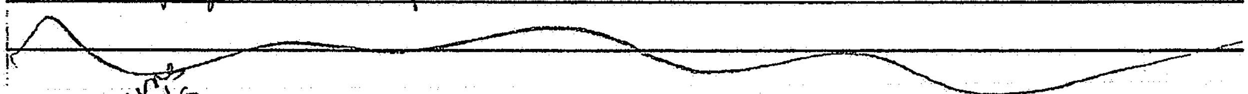
· wet & dry deposition

*What do I need for risk calculations??

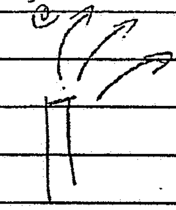
JV → refining

EM →

DL → running cone only; add ore roaster; determine high yr for wet deposition



3 runs 1's



do I have to know which type of run applies to my chemical, based on F_v?

F_v pg 85 of App 3

$$F_v = \frac{1 - cS_T}{\rho_L - cS_T} < 0.05$$

Mercury Wiz

412 749-5246

ENGINEERING DUPONT COMPUTATION SHEET

hypothetical / WORST-CASE
Predicted concentrations

~~introducting~~ modeling
- Added
- multipathway
- single chemical
- ~~[illegible]~~ @ existing facility

Need
- facility-specific info
- chemical-spec. info

Timeline → authoring in June/July
end-product

CHEMICAL INFO - need resource
- F_v
- Toxicity info (will drive what we can calculate)

APFO
- persistent

NC AIR TOXICS
(Mike Johnson @ Fayetteville)

Design parameters such that we can produce C8 & be protective of community
- Public perception
- Liability

- Fluoroproducts is the business

"Accepted" RISK benchmark

USE STANDARDS FOR MINIMUM ESSENTIAL INSTALLATIONS

CAB000248

EID547097

Wed, Mar,

NPDES #
NC0003573

Understand difference b/t new & old met. data

Fayetteville

- Debbie reran w/ new met data & refinements → concentrations look 4 to 6x lower.
- To reach 10x below CEG_A, can now meet w/ following conditions: .07 g/s release rate
  5,000 scfm flowrate 8500 scfm
  90' stack height 85
  60' building height 55'
  = .035 ug/m³ = 10 x CEG_{AIR}

- CEG_w:
Debbie - running wet & dry deposition for 10km radius
AB order map - Will look @ maps to determine extent of local watershed (drainage to Cape Fear River) vs expected deposition ⇒ will calculate total mass load to river on annual basis (lb/yr)
- Assuming complete & instantaneous mixing @ single point, will use annual avg river flow (ft³/yr) to calculate lb/ft³ equiv. concentration for comparison to CEG_w local
A layer deeper
~~X~~ drinking water intake is how far from plant site? near Wilmington ②
(if ≥ 1/2 mile, OK b/c can assume mixing is complete by then)
- Consider fish consumption - adults & children
Use Env. Factors handbook
$\boxed{\text{BCF } 1.8 \text{ \& } 9.0}$ use 10

www.training.ibm.com/ibmedu

CAB000252

EID547101

Joel Blake

AEL (what avg time-period? 24-hr?)
WORST-CASE 8-hr avg?

30"

48012

Joel Blake → 678-1285

Fayetteville
Bladen County / Cumberland Cty

34° 56' 29"
78° 50' 4"

LAT 34° 50'
LONG 78° 50'

1:24,000

{ Hope Mills Quadrangle
{ Cedar Creek

60

~~57.30~~ -78' 50"

34' 50"

34.9148
-78.847

35.8147
78.783

CAB000253

EID547102

Marge -

11
237

~~FOR MONDAY 23RD~~

- ~~Conference call~~
- ~~XMS~~
- ~~Catalog - order Bert something~~
- Tom Brennan → EFAST comments
- ~~Marlowe model~~
- outline for website
- ~~Jami Bare~~
~~(513) 569 7513~~
- ~~Thuy Mai = form~~
- ~~ATSDR~~
- ~~Check AmEx Bill~~

APPLE
4/

end of May

Smith
Brennan

THURS
Edith W

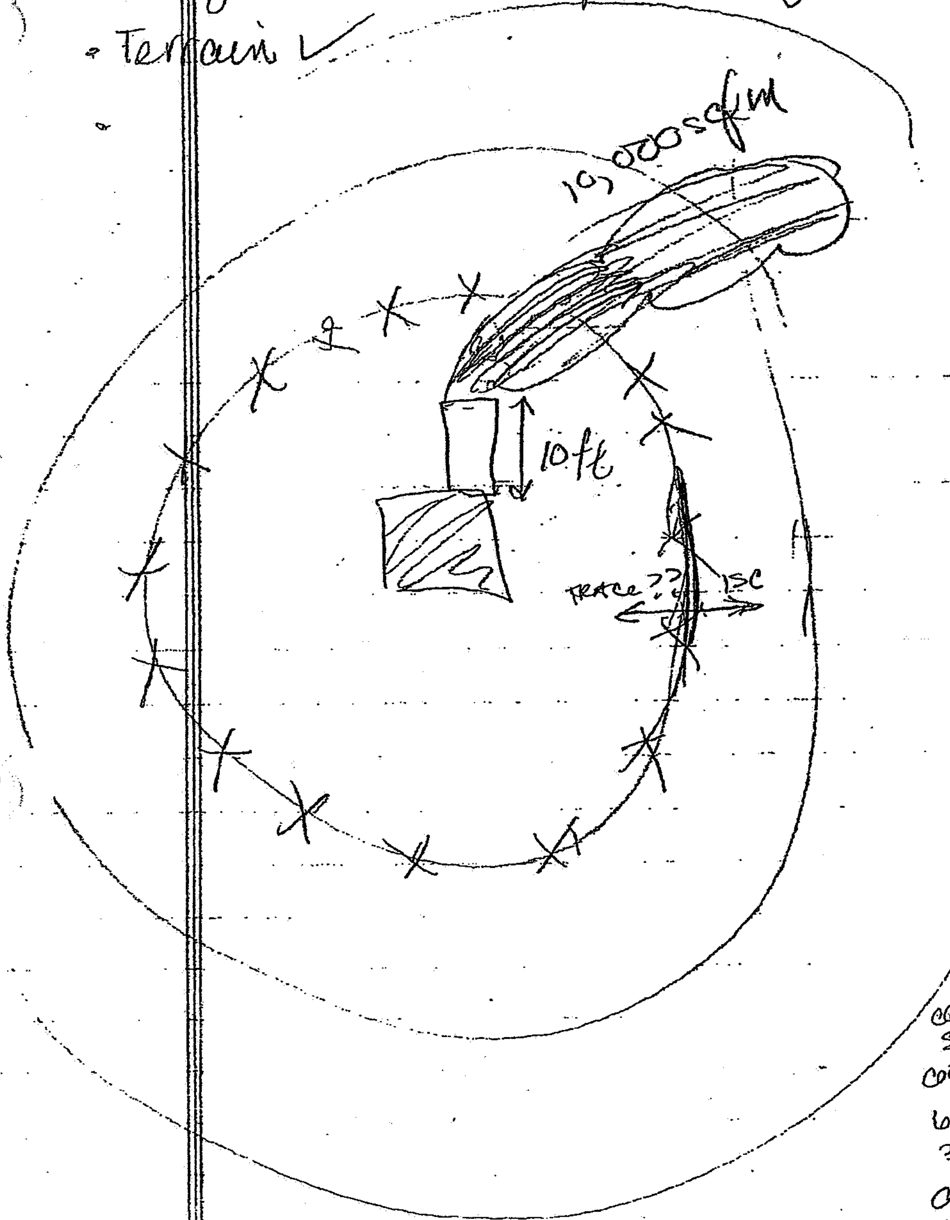
(804) 270
0811

CAB000254

EID547103

• Raleigh met data (Wayne → Fayetteville) ~~Superior~~
• Terrain ✓
•

698400
3858600



Call new source coordinates 3.28 ft

697700
3858000 } ft → m

OUTPUT

ANNUAL AVG CONC
TARGET = $< .3\ \mu g/m^3$

CAB000255

EID547104

4 ~~General Method~~
~~OUTPUT~~
~~General Method~~
~~Emissions~~
~~Physical Model~~
~~emissions~~ ~~model/calc~~

How?
~~General Method~~ is
to model
emiss
fate/transport
media

~~[illegible] of Ex A~~
~~How can comm be exposed?~~
~~Emissions can get into~~

~~#10 There are published algorithms to describe the uptake through these media~~

5. Output for exposure assessment is a

$\boxed{\text{dose}}$ of

a chemical
a person is exposed
to from
breathing it
touching it
ingesting it

risk is next step

14 General Method

charact emiss
employ model fate/transport
calc. media conc.
factor in [illegible] behaviors
calc. dose

6 Fayetteville - Background

considering install.
- New process ~~with high profile chemical~~ chemical
- High profile involved
- WW emissions captured
- impact of air emissions ~~[illegible] existing~~ to community in question

SHEET NO. ______

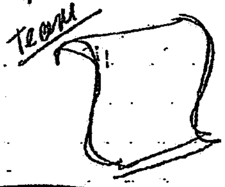
TITLE OF PROJ. OR STUDY ______ PROJ. OR STUDY NO. ______

SUBJECT ______ WORKS ______

______ COMPUTER ______ DATE ______

~~First~~

① Fayetteville Comm Exposure Assessment

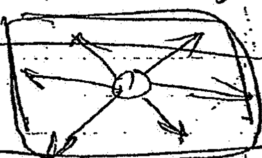


~~Quick things~~

② What is Comm. Exp Assessment?

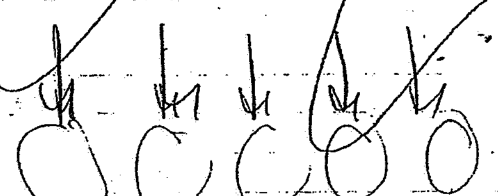
~~③ Modeling or sampling "exercise" to understand the poten~~

③ Evaluation to understand the potential health impacts from our emissions to the surrounding community.



Sites

④ ~~[illegible]~~ Generally:



~~Method~~ General Method

Emissions Source → Fate & Transport → Calculate Dose

Don't underestimate the sensitivity of such an exercise

~~May be reporting implications~~

G-46 REV. 6/99 CA ED EE CEG

$W×AT

ENGINEERING DUPONT COMPUTATION SHEET

TITLE OF PROJ. OR STUDY

SUBJECT

COMPUTER

SHEET NO.

PROJ. OR STUDY NO.

WORKS

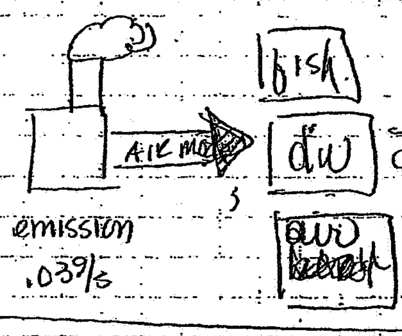
DATE

7 The Setting

River

Comm

8 Problem Formulation



veggies
cows
chickens
not an issue

9 WHAT DOSE IS ACCEPTABLE?

- No EPA tox data on our chemical
- But, Haskell has created Community Exp Guidelines for air, water & recomm fish ingest. level that relate to accep. dose

yardsticks = CEG, fish ingest value

10 The Compound

- APFO
- Highly Persistant
- Not volatile; very soluble

10 Assess Overview

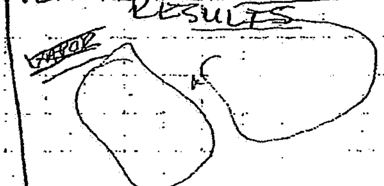
11 AIR EMISSIONS

~~Air emissions~~ MOT

1. vapor form: inhalation exp.
2. particles: deposit & get carried into River

SPECIATE?

12 ~~AIR MODELING~~ VAPOR PHASE RESULTS



13 ~~Watershed~~ Deposition

Assume all deposition goes to C.F. River through SW runoff

14 EXP. CALCU. - Dose eg.

15 Results Exp. Assess

- AIR
- DW:
- Fish

Conclusion: 0.039/s acceptable air emiss rate

USE STANDARDS FOR MINIMUM ESSENTIAL INSTALLATIONS

CAB000259

EID547108

16 Key ~~learnings~~

- This was not regul. enforced assessment, but a business dec.
- Bus. took a ~~chance~~ bold step toward risk exp. reduction before it occurred

~~- IS ... RIST/BA~~

- ~~Will also process design involve comm.~~ minimizing will ~~exposure~~ community exposure be a future component of process design?

CAB000260

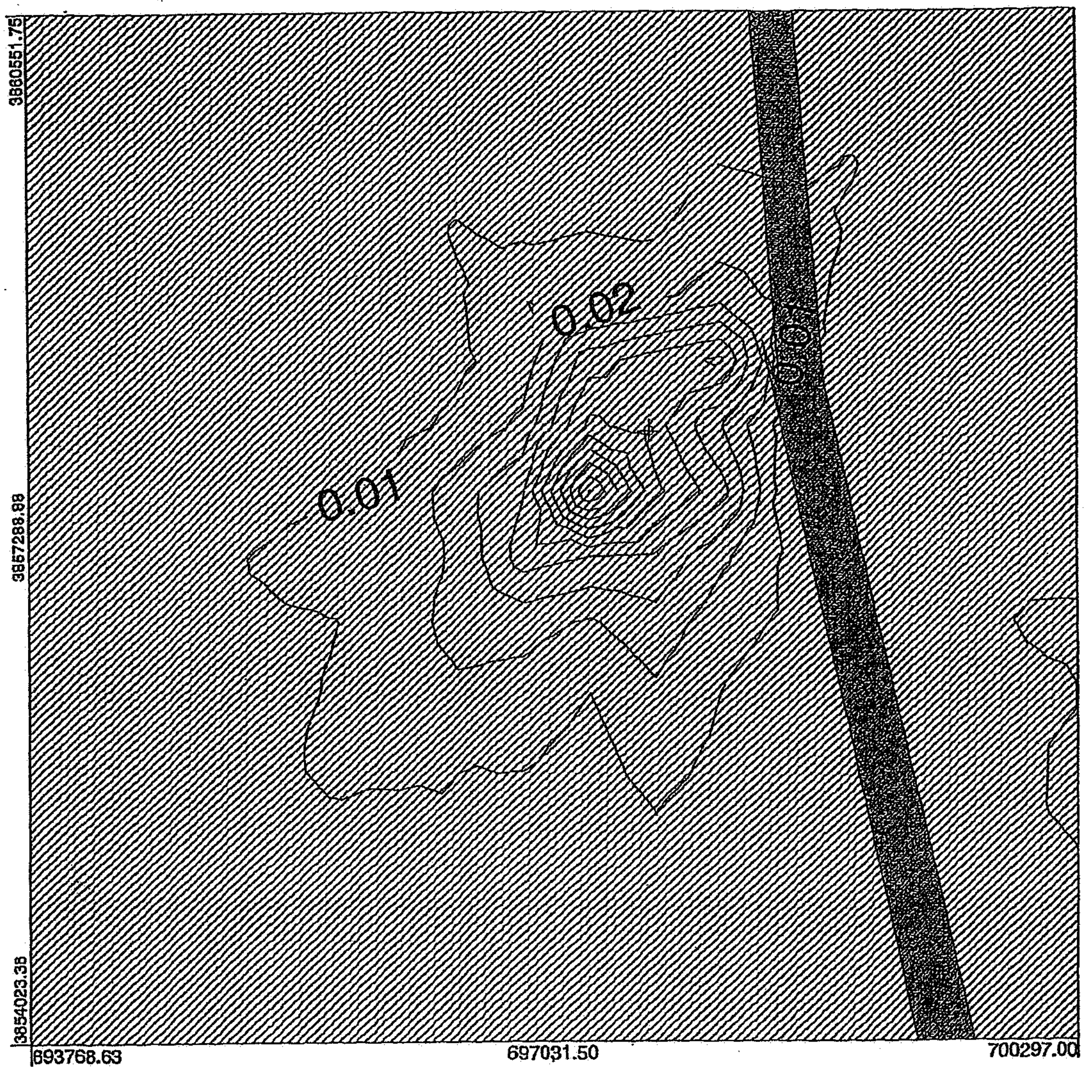
EID547109

Watershed area = 413,425931

PROJECT: FVILLE

AVERAGE WET+DRY PARTICLE DEP =

TITLE:



COMPANY NAME:
dupont

MODELER:
barton

DATE:
7/5/2001

IRAP-h View - Lakes Environmental Software

C:\IRAPVIEW\TEST.IRP

CAB000261

EID547110

(1) ~~Design features to~~

(1) WORKER EXP [PLANT COMMUNITY] → will do ~~after the~~ sampling after start-up

(2) Comm. exposure · AIR CEG pt of comparison

closest resident

~~benchmark (NC)~~

stack emissions

STACK EMISSIONS + fugitives

PFOA $CF_3(CF_2)_6COOH$

Acid fluoride = $CF_3(CF_2)_6COF$

PROJECT OBJECTIVES

Stormwater capture & testing → Chambers Wks

Wash water w C8 → CARBON → Treated H_2O → Chambers Wks

CARBON → Incineration

FSA + Iodide, etc. → incinerator

design minimizes fugitives

CAB000262

EID547111

Emissions red
100 lb in carcin ~~red~~ emission
10,000 lb " er

Where there are
CLGs & working on
new/modifying projects
should be looking
@

intro by
Pinchot

CAB000263

EID547112

Rinehart #94074

T. Bingman 6/19 ~~Edge~~ Fayetteville

→ DW intake is where
(compare mixing zone length to dist to intake
(<1/2 mi OK)

What are Cape Fear river uses?

on drive

consider

- DW
- Recreational (incidental ing., dermal contact)
- fish consumption
  ↳ mean adult
  children

non-carcinogen
RFD → input my CEGW

UCLM (95% Upper Confidence Level as a Mean)
↳ put in total conc in FZ
replace RFD CEGW

Bioconcentration (BCF) for fish

Water Col × BCF ⇒ fish tissue conc.

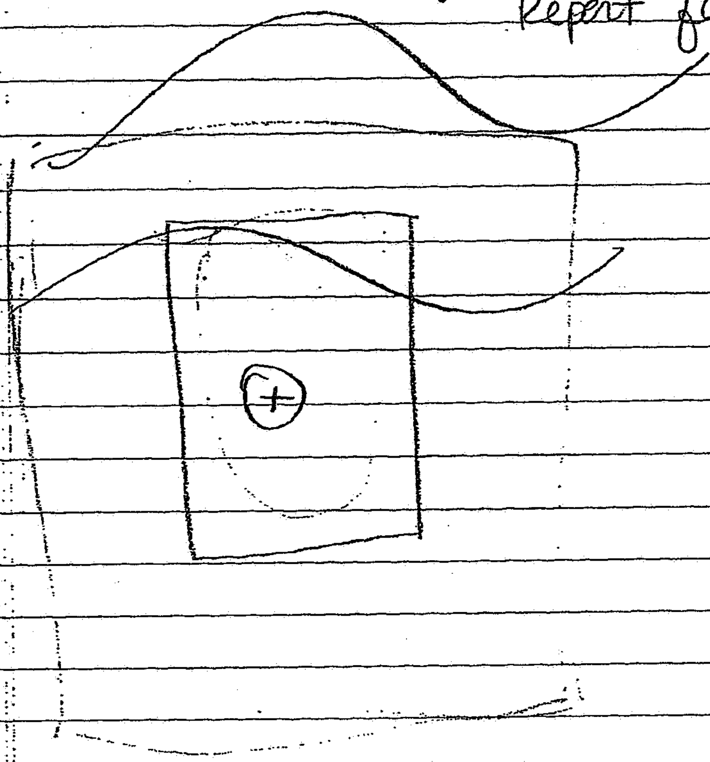
Robert Rinehart → DOCUMENT.

CAB000264

EID547113

Fayetteville

$\boxed{\text{July } 11^{th}}$ → DROP DEAD new defensible numbers
Report forthcoming



Washington Works (WV)

- conc in air → inhal
- Water deposition to river

*complic = GE next door may be contributing

Source: gw infiltration to dw

Question ~~but, how much~~

obj ① VAPOR, INHALATION dose for community so we can set appropriate DW guidelin

- Lubec area is boundary of study

② Looking for ongoing sources = runoff? air deposition : understand air exposure to community SOIL TYPES / GW infiltration

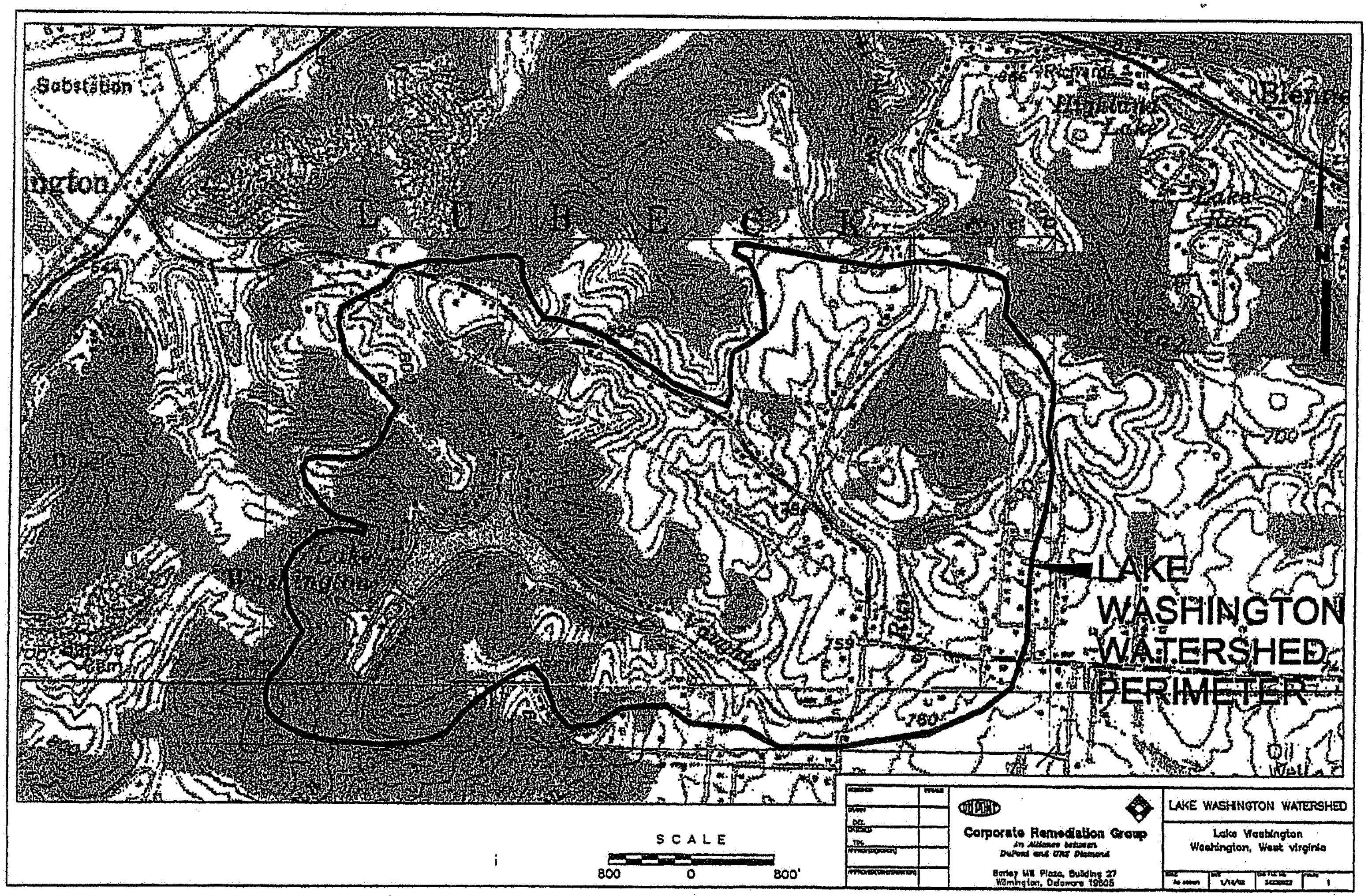
Andrew = hydrogeol.
Legal = John Bowman (Bernie Reilly)
scope / cost estimate

CAB000266

EID547115

Fayetteville Modeling Results

	Case 5 (ug/m3)	Location
1995	0.01448	697700E 3855200N
1996	0.01854	698400E 3858600N
1997	0.01987	698400E 3858600N
1998	0.01787	698400E 3858600N
1999	0.01827	698400E 3858600N
Release Rate (g/s)	0.03	
Stack Flow Rate (scfm)	4710	
Stack Velocity (ft/s)	100	
Stack Height (ft)	85	
Building Height (ft)	55	
Stack Diameter (ft)	1	
Temperature (K)	298	



CAB000155

EID547004

Washington Works C8 Modeling Files

2000 Emissions revised files

modeling files to support report: *Modeling Report for 2000 Emissions – Revision.*

Actual00r – Trinity files; no deposition, ambient air concentrations only

Act00Pr – Lakes files; full receptor grid; particulate phase emissions deposition
(maximum deposition rate included in report; this receptor grid used to calculate total deposition of particulate emissions (wet +dry) to Ohio River watershed (not included in report))

Act00Vr – Lakes files; full receptor grid; vapor phase emissions deposition
(maximum deposition rate included in report; this receptor grid used to calculate total deposition of vapor emissions (wet only) to Ohio River watershed (not included in report))

LH2000Pr – Lakes files; receptor grid for Little Hocking well watershed; particulate phase emissions deposition
(this receptor grid used to calculate total deposition of particulate emissions (wet + dry) to Little Hocking well watershed (included in report))

LH2000Vr – Lakes files; receptor grid for Little Hocking well watershed; vapor phase emissions deposition
(this receptor grid used to calculate total deposition of vapor emissions (wet only) to Little Hocking well watershed (included in report))

LW2000P – Lakes files; receptor grid for Lake Washington watershed; particulate phase emissions deposition
(this receptor grid used to calculate total deposition of vapor emissions (wet + dry) to Lake Washington watershed (not included in report))

LW2000V – Lakes files; receptor grid for Lake Washington watershed; vapor phase emissions deposition
(this receptor grid used to calculate total deposition of vapor emissions (wet only) to Lake Washington watershed (not included in report))

model runs to support 2002/2003 projected

2002 Emissions

Actual02 – Trinity files no deposition, ambient air concentrations only
(max concentration and Surfer plot given to Rob Pinchot; no report written)

2003 Emissions

Actual03r2 – Trinity files no deposition, ambient air concentrations only
(max concentration and Surfer plot given to Rob Pinchot; no report written)

Instructions for Calculating Total Deposition to a Watershed:

1. After running Lakes model, in Excel open *runname*.pos file which will be in a folder named *runname*.IS in the same area where the Lakes input file is saved.

2. Use the Wizard to set column breaks and import the file.

3. For each receptor (each row in Excel) set up columns to calculate total, dry and wet deposition in g/yr. This is done by multiplying the deposition rate output from the model ($g/m^2/yr$) by 10,000 m^2 (for a 100 meter receptor grid).

4. Sum each column at the bottom of the spreadsheet to get the totals for Total, Dry and Wet deposition.

LAKES: ISC MODEL → Go to Backup
EXCEL NOW SIP $60 to Hunroads [illegible]

[illegible]

CAB000267

EID630884

Washington Works C8 Files (excluding modeling files)

Lake Washington Watershed – outline of watershed drawn by Andrew Hartten
Little Hocking Well Field Watershed - outline of watershed drawn by Andrew Hartten

pkbiln96.dep – met data file (one year b/c onsite data)
CoolvilleWV.dem
CutlerWV.dem
LithockWV.dem
LubeckWV.dem
ParkersburgWV.dem
SouthParkersburgWV.dem
terrain files
- digital terrain elevation files for use in ISC model

---

1 2000 Emissions First Modeling Run consent order

Final Modeling Report 4-17-02 – report of 2000 emissions modeling originally submitted to WVDAQ
WVDAQ Presentation – presentation used in May 2002 to present 2000 emissions modeling results
submitted
power pt
Building Plot – bitmap file for building plot plan used in modeling reports
Vapor Scavenging Coefficients – calculation of maximum coefficient to use in the model (based on Steve Grise' work for the consent order submittal)

Little Hocking - 2000 Particulate Phase Emissions
Little Hocking - 2000 Vapor Phase Emissions
separate runs
- calculation of total deposition for Little Hocking watershed based on 2000 emissions. Included in 4-17-02 report.

Lake Washington - 2000 Particulate Phase Emissions
Lake Washington - 2000 Vapor Phase Emissions
Ohio River Watershed - 2000 Particulate Phase Emissions
Ohio River Watershed - 2000 Vapor Phase Emissions
- calculation of total deposition for the Lake Washington and Ohio River watersheds based on 2000 emissions. These were not included in the 4-17-02 report
not included in report

---

2 2002 Emissions Second Modeling Run

Modeling Report for 2000 Emissions – Revision 1 – revision of 4-17-02 report made after May meeting (added two new emission points; imported terrain elevations using the highest option instead of interpolation)

with minor modifications

Little Hocking - Revised 2000 Particulate Phase Emissions
Litle Hocking - Revised 2000 Vapor Phase Emissions
- calculation of total deposition for Little Hocking watershed based on 2000 emissions. Included in revised report.

---

3 Recent Modeling Runs (2002 and 2003 Emissions)

Stacks & Surfactant Emissions-12c – latest stack parameter and emission s/s from Chris Shoop site guy
2002 and 2003 C8 Emissions – calculation of emission rate input (g/s) for model based on Chris Shoop's latest s/s

ambient conc only,
no deposition

Looking @ projected ambient levels in community based on expected reductions
~~2002~~ = JUST OKAY
2003 = BELOW TAP 6.7 - OK.

CAB000268

EID630885

Attorney-Client Privilege, Request for Legal Advice

DRAFT PROPOSAL

Exposure Evaluation for APFO Releases from Washington Works

Objective

Work is proposed to model the dispersion characteristics of APFO air emissions from Washington Works operations. These modeling results will be used to calculate

- Potential inhalation exposure to nearby Lubec community residents as compared with the corporate Community Exposure Guideline for APFO in air (CEG_A).
- Conservative estimates of APFO mass loading to the Ohio River based on total deposition to the land surface.

This information will be used to determine the relative contribution of air and wastewater emissions to the aggregate exposure of local residents. It will then be possible for the site to target its reduction program toward the most critical emissions sources.

Background

Washington Works is interested in understanding the aggregate exposure of any community resident to releases of APFO through drinking water ingestion and inhalation. Although the site has considerable sampling information for the drinking water, air sampling is more difficult and expensive to perform. As a good and widely accepted alternative, the site will perform modeling using an EPA approved air dispersion model.

Scope of Work

This section describes 4 tasks required to meet the above objectives.

Task 1: Gather relevant site information and modeling input parameters.
The following information is required:

- Average annual emission rates for each source
- Source characteristics, such as airflow rate, exit velocity, stack dimensions, and temperature.
- Site-specific meteorology
- Site-specific topography
- Site building information
- Local USGS maps

Task 2: Perform air dispersion modeling using the Industrial Source Complex Short Term 3 (ISCST3) Model. Output from the model will include

- annual average vapor phase concentrations (ug/m3) over a 10 km radius and identification of the location of maximum concentration in the Lubec community
- maximum and average wet deposition (mg/m2/yr) over a 10 km radius
- maximum and average dry deposition (mg/m2/yr) over a 10 km radius

Task 3: Evaluation of inhalation and drinking water exposures from the air emission pathway.
This task will include use of the Industrial Risk Assessment Program software from Lakes Environmental. This program translates the ISCST3 results into a form for determining site-specific exposure information. Results of task 3 will include

- Comparison of maximum vapor phase concentration for Lubec community determined in Task 2 with the CEG_A.
- Calculation of the total dry and wet deposition in the watershed of interest and the resulting mass loading to the Ohio River
- Evaluation of the relative contribution of air and wastewater emissions to the aggregate exposure of local residents.

Task 4: Report preparation.

Resources
The following resources will be valuable in achieving the outlined objectives:

- Rob Pinchot: Project lead and coordinator
- Ta-Wei Fu: Plant emission data
- Cathie Barton: DuET, exposure assessment interpretation
- Debbie Mulrooney: DuET, air dispersion modeler
- Andrew Hartten: Interpretation of wet and dry deposition rates
- Tim Bingman: Integration of all exposure modeling results and interpretation

DuET Cost Estimate
SBU funding will be needed to fund Cathie Barton and Debbie Mulrooney's time and to procure any meteorological data and maps that are needed.

DuET estimates approximately 50 total man-hours of work, equating to approximately $8,000 for this proposal.

Assumptions

- Air emission rate = 0.07 g/sec emission rate
- 5 kilometers in each direction of source = watershed boundaries
- Cape Fear River is receptor
- Treat as a single point discharge with complete mixing (OK because drinking water receptors far downstream)
- Surface area of water body small compared with watershed area
- CEGw = 1 ug/L

AVERAGE CONDITIONS

<u>Total Deposition To Watershed</u>

- Average wet and dry deposition rates for particles = 0.0033 s/m2-yr
- Average wet deposition from vapor phase = 0.0026 s/m2-yr
- Total deposition =0.0059 s/m2-yr x 0.07 g/s = 0.000413 g/m2-yr

<u>Load to River</u>

- Load to river = deposition per square meter x watershed area
- L = (0.000413 g/m2-yr) x (118 E6 square meters) = 48,734 g/yr

<u>Concentration in River</u>

- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per day
- 48,734 g/yr x 1/ 456E10 = 1.07 E-8 g/l = **<u>0.0107 ug/L</u>**

MAXIMUM CONDITIONS

<u>Total Deposition To Watershed</u>

- Max wet and dry deposition rates for particles = 0.216 s/m2-yr
- Average wet deposition from vapor phase = 0.2 s/m2-yr
- Total deposition =0.416 s/m2-yr x 0.07 g/s = 0.029 g/m2-yr

<u>Load to River</u>

- Load to river = deposition per square meter x watershed area
- L = (0.029 g/m2-yr) x (118 E6 square meters) = 3,422,000 g/yr

<u>Concentration in River</u>

- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per day
- 3,422,000 g/yr x 1/ 456E10 = 7.5 E-7 g/l = **<u>0.75 ug/L</u>**

Attorney-Client Privilege, Request for Legal Advice

DRAFT PROPOSAL
Exposure Evaluation for APFO Releases from Washington Works

Objective
Work is proposed to model the dispersion characteristics of APFO air emissions from Washington Works operations. These modeling results will be used to calculate

- Potential inhalation exposure to nearby Lubec community residents as compared with the corporate Community Exposure Guideline for APFO in air (CEG_A).
- Conservative estimates of APFO mass loading to the Ohio River based on total deposition to the land surface.

This information will be used to determine the relative contribution of air and wastewater emissions to the aggregate exposure of local residents. It will then be possible for the site to target its reduction program toward the most critical emissions sources.

Background
Washington Works is interested in understanding the aggregate exposure of any community resident to releases of APFO through drinking water ingestion and inhalation. Although the site has considerable sampling information for the drinking water, air sampling is more difficult and expensive to perform. As a good and widely accepted alternative, the site will perform modeling using an EPA approved air dispersion model.

Scope of Work
This section describes 4 tasks required to meet the above objectives.

Task 1: Gather relevant site information and modeling input parameters.
The following information is required:

- Average annual emission rates for each source
- Source characteristics, such as airflow rate, exit velocity, stack dimensions, and temperature.
- Site-specific meteorology
- Site-specific topography
- Site building information
- Local USGS maps

Task 2: Perform air dispersion modeling using the Industrial Source Complex Short Term 3 (ISCST3) Model. Output from the model will include

- annual average vapor phase concentrations (ug/m3) over a 10 km radius and identification of the location of maximum concentration in the Lubec community
- maximum and average wet deposition (mg/m2/yr) over a 10 km radius
- maximum and average dry deposition (mg/m2/yr) over a 10 km radius

Task 3: Evaluation of inhalation and drinking water exposures from the air emission pathway.
This task will include use of the Industrial Risk Assessment Program software from Lakes Environmental. This program translates the ISCST3 results into a form for determining site-specific exposure information. Results of task 3 will include

- Comparison of maximum vapor phase concentration for Lubec community determined in Task 2 with the CEG_A.
- Calculation of the total dry and wet deposition in the watershed of interest and the resulting mass loading to the Ohio River
- Evaluation of the relative contribution of air and wastewater emissions to the aggregate exposure of local residents.

Task 4: Report preparation.

Resources

The following resources will be valuable in achieving the outlined objectives:

- Rob Pinchot: Project lead and coordinator
- Ta-Wei Fu: Plant emission data
- Cathie Barton: DuET, exposure assessment interpretation
- Debbie Mulrooney: DuET, air dispersion modeler
- Andrew Hartten: Interpretation of wet and dry deposition rates
- Tim Bingman: Integration of all exposure modeling results and interpretation

DuET Cost Estimate

SBU funding will be needed to fund Cathie Barton and Debbie Mulrooney's time and to procure any meteorological data and maps that are needed.

DuET estimates approximately 50 total man-hours of work, equating to approximately $8,000 for this proposal.

Fayetteville

CAB000171

EID547020

Assumptions
- Air emission rate = 0.03 g/sec emission rate
- Watershed boundary is either 5 kilometers or 10 kilometers in each direction (both evaluated)
- Cape Fear River is receptor
- Treat as a single point discharge with complete mixing (OK because drinking water receptors far downstream)
- Surface area of water body small compared with watershed area
- CEGw = 1 ug/L

AVERAGE CONDITIONS - 10 kilometer range from the source in all directions

Total Deposition To Watershed
- Average wet and dry deposition rates for particles = 0.00154 s/m2-yr (via ISC and LAKES models)
- Average wet deposition from vapor phase not included due to involatile nature of the compound
- Total deposition =0.00154 s/m2-yr x 0.03 g/s = 4.62 E-5 g/m2-yr

Load to River
- Load to river = deposition per square meter x watershed area
- L = (4.62 E-5 g/m2-yr) x (413.4 E6 square meters) = 19,100 g/yr

Concentration in River
- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per year
- 19,100 g/yr x 1/ 456E10 = 4.2 E-9 g/l = **approximately 0.004 ug/L**

AVERAGE CONDITIONS - 5 kilometer range from the source in all directions

Total Deposition To Watershed
- Average wet and dry deposition rates for particles = 0.0035 s/m2-yr
- Average wet deposition from vapor phase not included due to involatile nature of the compound
- Total deposition =0.0035 s/m2-yr x 0.03 g/s = 0.000105 g/m2-yr

Load to River
- Load to river = deposition per square meter x watershed area
- L = (0.000105 g/m2-yr) x (118.8 E6 square meters) = 12,500 g/yr

Concentration in River
- Cape Fear mean flow = 1.25 x E4 Million Liters per Day = 1.25 E10 liters per day
- 1.25 E10 liters per day = 456 E10 liters per year
- 12,500 g/yr x 1/ 456E10 = 2.74 E-9 g/l = **approximately 0.003 ug/L**