Air & Waste Management Association

Niagara Frontier Section

BAPG

Annual Enrichment Seminar January 25, 2024 Buffalo, NY

# The Role of the Environmental Professional in Litigation Support


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Zoghlin GROUP

## Learner Objectives

1) Understanding the process of becoming a court-qualified Expert in matters associated with the environment;

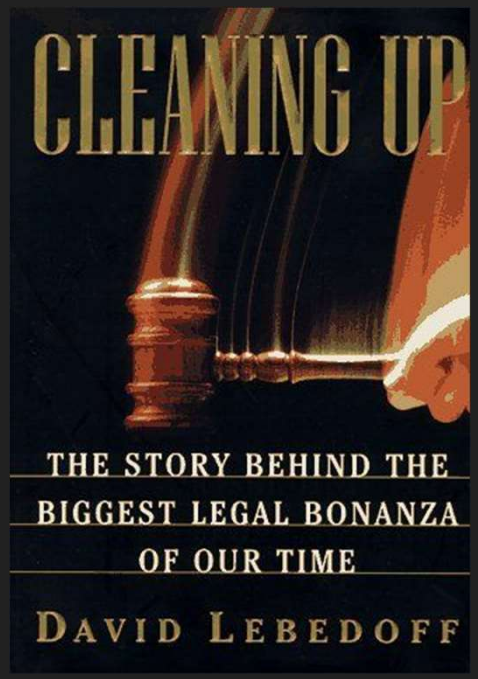
1) Understanding legal processes such as complaints, confidentiality, discovery and settlements;

1) Understanding the processes necessary to provide useful technical and ethical support to litigation teams representing plaintiffs and defendants; and

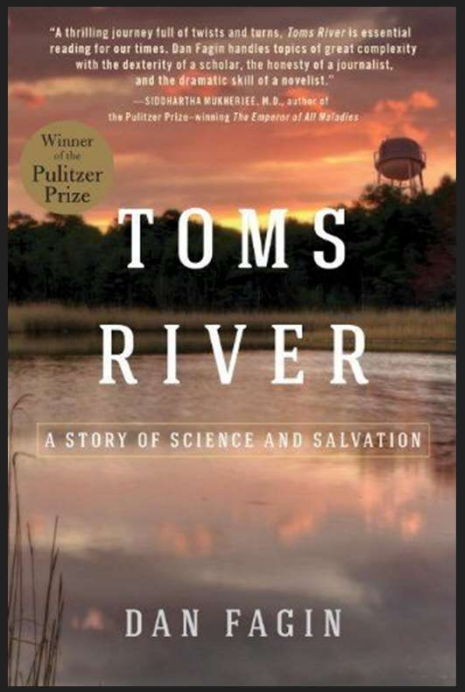
1) Understanding how routine project or facility work by an environmental professional can end up in litigation.

## Interesting Non-technical, Dramatic Introductions

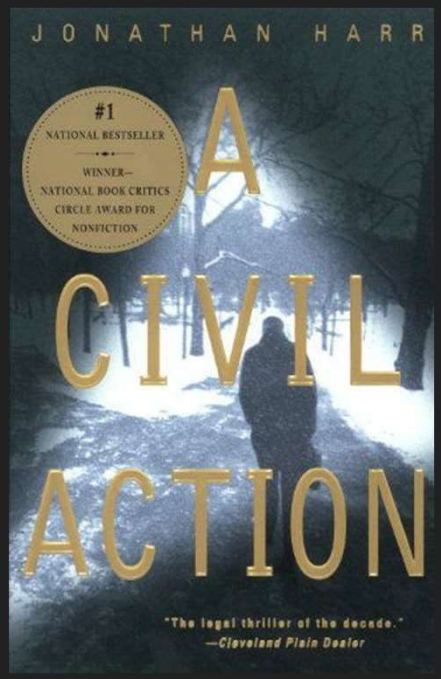
Exxon
Valdez
Alaska, 1989



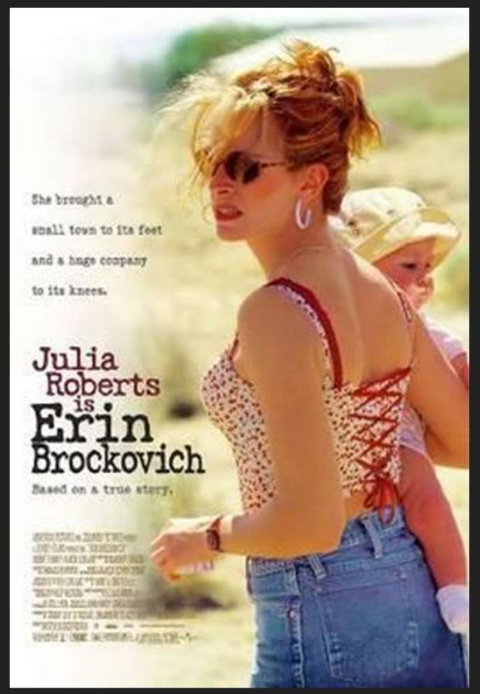

Ciba-Geigy
New Jersey




Anderson v.
Cryovac
Woburn, MA

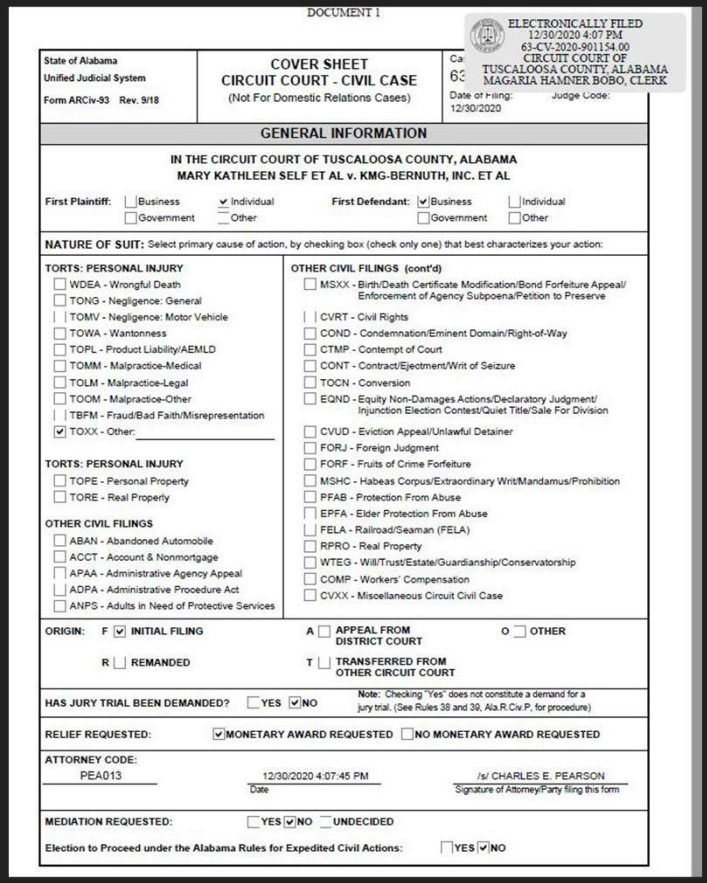



PG&E
Hinkley, CA



# Litigation: A Brief Introduction

- The Law Suit aka The “Matter”
- Engagement
- Litigation Strategy
- Confidentiality
- Discovery
- Depositions
- Expert Testimony
- Settlement or Judgement



DOCUMENT 1

ELECTRONICALLY FILED
12/30/2020 4:07 PM
63-CV-2020-901154.00
CIRCUIT COURT OF
TUSCALOOSA COUNTY, ALABAMA
MAGARIA HAMNER BOBO, CLERK

State of Alabama
Unified Judicial System
Form ARCiv-93 Rev. 9/18

**COVER SHEET**
**CIRCUIT COURT - CIVIL CASE**
(Not For Domestic Relations Cases)

Ca 63
Date of Filing: 12/30/2020
Judge Code:

**GENERAL INFORMATION**

**IN THE CIRCUIT COURT OF TUSCALOOSA COUNTY, ALABAMA**
**MARY KATHLEEN SELF ET AL v. KMG-BERNUTH, INC. ET AL**

**First Plaintiff:** ☐ Business ☑ Individual ☐ Government ☐ Other
**First Defendant:** ☑ Business ☐ Individual ☐ Government ☐ Other

**NATURE OF SUIT:** Select primary cause of action, by checking box (check only one) that best characterizes your action:

**TORTS: PERSONAL INJURY**
- ☐ WDEA - Wrongful Death
- ☐ TONG - Negligence: General
- ☐ TOMV - Negligence: Motor Vehicle
- ☐ TOWA - Wantonness
- ☐ TOPL - Product Liability/AEMLD
- ☐ TOMM - Malpractice-Medical
- ☐ TOLM - Malpractice-Legal
- ☐ TOOM - Malpractice-Other
- ☐ TBFM - Fraud/Bad Faith/Misrepresentation
- ☑ TOXX - Other: _____

**TORTS: PERSONAL INJURY**
- ☐ TOPE - Personal Property
- ☐ TORE - Real Property

**OTHER CIVIL FILINGS**
- ☐ ABAN - Abandoned Automobile
- ☐ ACCT - Account & Nonmortgage
- ☐ APAA - Administrative Agency Appeal
- ☐ ADPA - Administrative Procedure Act
- ☐ ANPS - Adults in Need of Protective Services

**OTHER CIVIL FILINGS (cont'd)**
- ☐ MSXX - Birth/Death Certificate Modification/Bond Forfeiture Appeal/ Enforcement of Agency Subpoena/Petition to Preserve
- ☐ CVRT - Civil Rights
- ☐ COND - Condemnation/Eminent Domain/Right-of-Way
- ☐ CTMP - Contempt of Court
- ☐ CONT - Contract/Ejectment/Writ of Seizure
- ☐ TOCN - Conversion
- ☐ EQND - Equity Non-Damages Actions/Declaratory Judgment/ Injunction Election Contest/Quiet Title/Sale For Division
- ☐ CVUD - Eviction Appeal/Unlawful Detainer
- ☐ FORJ - Foreign Judgment
- ☐ FORF - Fruits of Crime Forfeiture
- ☐ MSHC - Habeas Corpus/Extraordinary Writ/Mandamus/Prohibition
- ☐ PFAB - Protection From Abuse
- ☐ EPFA - Elder Protection From Abuse
- ☐ FELA - Railroad/Seaman (FELA)
- ☐ RPRO - Real Property
- ☐ WTEG - Will/Trust/Estate/Guardianship/Conservatorship
- ☐ COMP - Workers' Compensation
- ☐ CVXX - Miscellaneous Circuit Civil Case

**ORIGIN:** F ☑ INITIAL FILING; A ☐ APPEAL FROM DISTRICT COURT; O ☐ OTHER; R ☐ REMANDED; T ☐ TRANSFERRED FROM OTHER CIRCUIT COURT

**HAS JURY TRIAL BEEN DEMANDED?** ☐ YES ☑ NO
Note: Checking "Yes" does not constitute a demand for a jury trial. (See Rules 38 and 39, Ala.R.Civ.P, for procedure)

**RELIEF REQUESTED:** ☑ MONETARY AWARD REQUESTED ☐ NO MONETARY AWARD REQUESTED

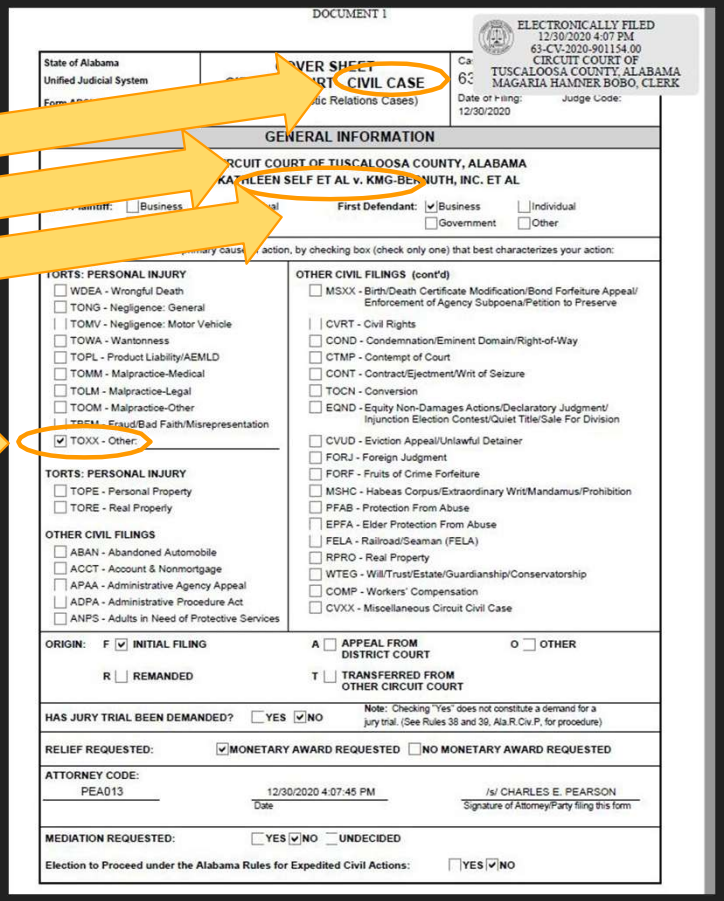
**ATTORNEY CODE:** PEA013
12/30/2020 4:07:45 PM (Date)
/s/ CHARLES E. PEARSON (Signature of Attorney/Party filing this form)

**MEDIATION REQUESTED:** ☐ YES ☑ NO ☐ UNDECIDED

**Election to Proceed under the Alabama Rules for Expedited Civil Actions:** ☐ YES ☑ NO

# Lawsuit Concepts

- Criminal or Civil
- Plaintiff
- Defendant
- Nature
  - Tort (Injury)
  - Toxic Tort (from Toxic Chemicals
  - Other (More on this Later)



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MEDIATION REQUESTED: ☐ YES ☑ NO ☐ UNDECIDED

Election to Proceed under the Alabama Rules for Expedited Civil Actions: ☐ YES ☑ NO

# What're the Standards for an Expert Opinion?

**Similarities:**

Must be qualified by knowledge, skill, experience, training, or education.

Experts may give their opinions.

Opinion/testimony must help the fact finder understand the evidence/determine a fact.

May base opinions on facts/data personally observed or are made aware of.

Can rely on out-of-court material, so long as the material is deemed reliable.

See FRE 702 and 703, and NYRE 7.01(1)(a-b), 7.01(2), and 7.01(5)(b).

The four characteristics that impact and enhance an experts' credibility are knowledge, confidence, trustworthiness, and likability.

Judges and juries look to experts to step into the role of professor and succinctly explain technical concepts in a way they can understand.

Not all expert witnesses need to have advanced degrees. Field experience often holds as much credibility.

# What're the Standards for an Expert Opinion?

**Differences:**

## For opinion to be admissible…

| Federal | State |
|---|---|
| Must be **more likely than not** that: (1) the expert's knowledge will help the trier of fact understand the evidence/determine a fact, (2) the testimony is based on sufficient facts/data, (3) the testimony is the product of reliable principles/methods that (4) the expert has applied to the facts of the case. FRE 702. | The opinion must be: (1) scientific, technical, medical, or some other specialized knowledge, (2) the subject matter is beyond the knowledge of a typical finder of fact, and (3) the testimony will help the finder of fact to understand the evidence/determine a fact. NYRE 7.01(1)(a-b). |

## When testimony is based on scientifically developed procedures…

| Federal | State |
|---|---|
| Must establish: (1) the theory/procedure can and has been tested, (2) subjected to peer review and publication, (3) its known or potential error rate, (4) standards controlling its operation, and (5) whether it has attracted widespread acceptance within the relevant scientific community. See FRE 702 & 703, and *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993). | Admissible only where the technique is generally accepted as reliable in the relevant scientific community.<br>Must establish: (1) the theory underlying the procedure/test is generally accepted in the relevant scientific community, (2) general acceptance that the procedure/test produces reliable and accurate results, and (3) the procedure/test was conducted in a way as to yield accurate results. See NYRE 7.01(2), and *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923). |

## Engagement:

- Curriculum Vitae aka Professional Profile
  - Subject Matter Expertise
  - Credentials
  - Representative Publications
  - Licenses
  - Languages
  - Experience Summary
  - Representative Projects and/or Cases
- In the academic world, this can be many pages. For instance, the engineer in my case study is a professor emeritus who wrote three books on air modeling and has well over 200 published papers. His CV was almost 20 pages long!

thomas j. morahan. p.g.

**subject matter expertise**

- CERCLA Cost Recovery Support
- Environmental Site Investigation and Characterization
- CERCLA Technical Guidance
- Environmental Insurance Claims
- Agency Negotiations, Strategic Guidance and Expert Testimony
- Organic and Inorganic Contaminant Transport Hydrogeology

**credentials**

- B.A., Geology, 1979 Rutgers University, Newark, New Jersey
- M.S., Geology, 1981, Sul Ross State University, Alpine, Texas
- Former Director International Air and Waste Management Association

**representative publications**

- Mercury Transport and Distribution, Texas Academy of Science., 1982
- Packer Assembly for Plume Tracking, NWWA, 1986
- Seminar: Introduction to Hazardous Waste Investigation Equipment 1983
- Hazardous Waste Investigation, Haz. Mat. 1983
- Downhole Television, Groundwater Monitoring Review, 1984
- Mobile Lab Use in Site Investigations, NWWA, 1991
- Full List Available

**licensee**

- Professional Geologist State of Wyoming No. PG-1892
- Professional Geologist State of New York No. 001199

**languages**

- English – native

nygeology

**experience summary**

Thomas J. Morahan is a Professional Geologist with decades of experience in environmental site investigation and characterization. After completing a master's degree focused on geochemical transport and distribution, he became a member of the USEPA Region II Field Investigation Team for the Investigation of Uncontrolled Hazardous Waste Sites. Mr. Morahan has performed site characterization efforts at hundreds of chemical plants, manufacturing facilities, landfills and defense installations in 41 states and abroad. Mr. Morahan was a Co-founder of ASTM E-50, co-author of ASTM E 1527 Standard Practice for Environmental Site A[illegible]ssessment and the original leader of the ASTM task group that developed t[illegible]guide for Phase II assessments used to investigate sites. In the ea[illegible] founded a Austin, Texas based company to focus on the use of advanced field technologies and went on to help form several other consultancies that were acquired by larger national and international consulting firms. Mr. Morahan is the founder and Principal Scientist at nygeology.

**representative projects**

Principal-in-Charge and lead investigator providing expert defense support to excess carriers in a major environmental claim. Performed technical critique of $816 Million in claims made using probabilistic models. Examined practices, spill events, and compliance with NCP cost recovery, as well as independent engineering cost estimates for settlement negotiations.

Expert in landfill litigation matter in New York. Reviewed annual reports, developed waste profiles and presented monthly information from NYSDEC files to support a major waste management company in a lawsuit against a local Landfill. The suit was settled during trial.

Expert for the defense of a multi-million cost recovery suit by a municipality against an industrial client's insurance policy. Involved forensic characterization of environmental releases at the site, a review of contractor invoices, and preparation of cost analysis to negotiate the settlement.

Expert representing the lead PRP in USEPA's pilot Superfund cost allocation program for a test case in New York. Reviewed the complete administrative record at USEPA Region II, NYSDEC Region 8 and the local public library to support the client's proposed allocation.

Expert for the defense in a contaminated property matter in New York City. Prepared an affidavit to stay an order to close a leased outparcel that would have forced a major facility to shut down. The affidavit kept all parts of the facility operational with minimal impact to operations at the site.

Expert in a Bench Trial regarding the source of fuel contamination. As an expert witness, successfully presented evidence in Court on the origin of the spills using additive fingerprints.

Acted as the lead technical consultant in a confidential tort case alleging personal damages from exposure during the investigation of a municipal landfill. The landfill is a listed hazardous waste site in the state of New York.

Principal Scientist for the defense of a cost recovery action under the New York State brownfields program. A municipality worked with the State of New York to conduct an investigation and remediation of a release of petroleum on the Hudson River. The state is currently attempting to recover $16 Million from a former owner, however, many owners since the original property transfer in 1963 were likely responsible for the contamination. Work involves an intensive review of historical operations at the site, including its post-property transfer operation as a C&D landfill and a convenience dumpsite for the municipality.

Performed a cost analysis of an environmental insurance claim in New Jersey. Examined the alleged release, reviewed contractor invoices and developed cost estimates for appropriate payment of the claim.

## Litigation Strategy

- Plaintiff or Defendant
- Type of Case
  - Cost Recovery
  - Toxic Tort
  - Product Liability
  - Negligence
- Legal Theory
  - Varies with Jurisdiction
- Open Questions
- Data Requirements
- Initial Activities

## Confidentiality

- The NonDisclosure Agreement
  - Your company may have one that binds you already
- Attorney Client Privilege
  - Attorney Work Product Markings
    - Your work requested by your lawyer client
  - Documents Marked
    - Privileged and Confidential
  - Communications and Emails Marked
    - CONFIDENTIAL: plaintiff v defendant

## Are Communications with Counsel Privileged?

**Similarities:**

Materials prepared in anticipation of litigation/trial by or for another party may be obtained only upon a showing of substantial need.

Substantial need = the other party cannot, without undue hardship, obtain the substantial equivalent of the information.

See FRCP 26(b)(3)(A) and CPLR 3101(d)(2).

If retained only for consulting purposes and not to be called at trial, then exempt from disclosure.

See FRCP 26(b)(3)(D) and CPLR 3101(d)(1)(i).

Otherwise, nothing is "off the record"!

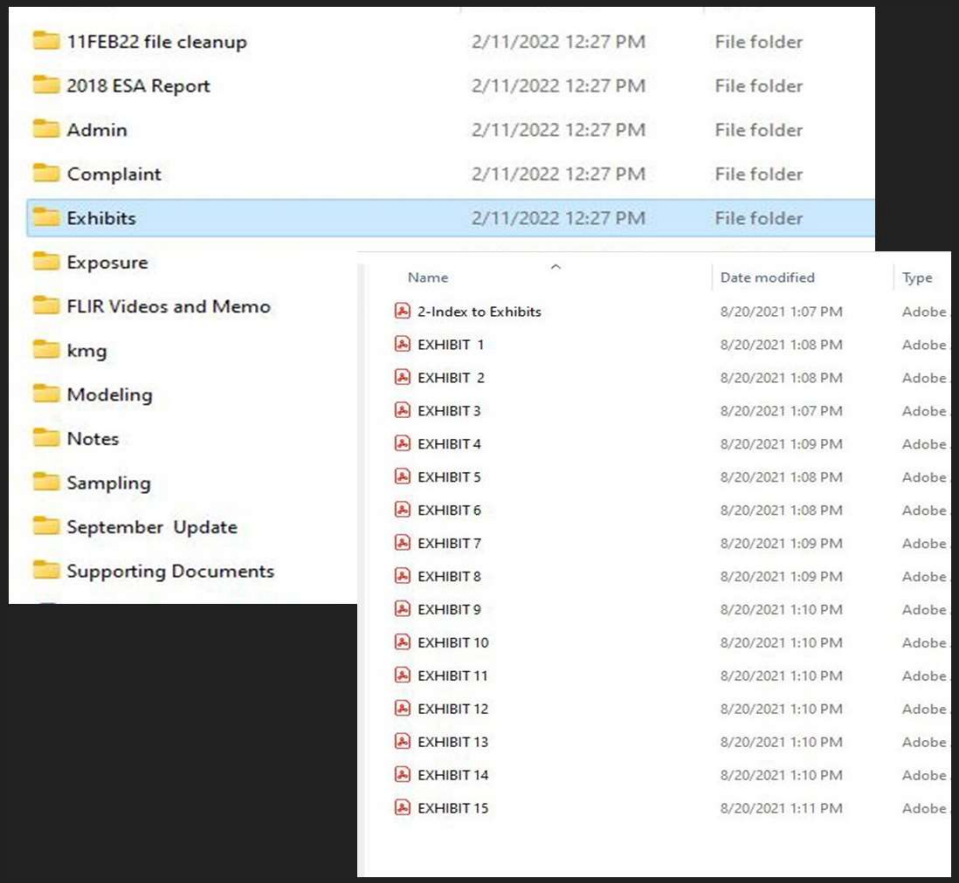
# Are Communications with Counsel Privileged?

**Differences:**

| Federal | State |
|---|---|
| Communications are protected except to the extent that the communications:<br>1. Relate to compensation for the expert's study or testimony;<br>2. Identify facts or data that the party's attorney provided and that the expert considered in forming the opinions to be expressed; and<br>3. Identify assumptions that the party's attorney provided and that the expert relied on in forming the opinions to be expressed.<br>Essentially, what is required in the expert's report that must be prepared and disclosed.<br>FRCP 26(b)(3)(C). | If the expert chooses to prepare a draft or final report, disclosure of the communications is mandatory only if:<br>1. Physical evidence related to the report is lost or destroyed; or<br>2. Some other unique situation exists that prevents the information sought from being obtained from other sources. |

# Discovery

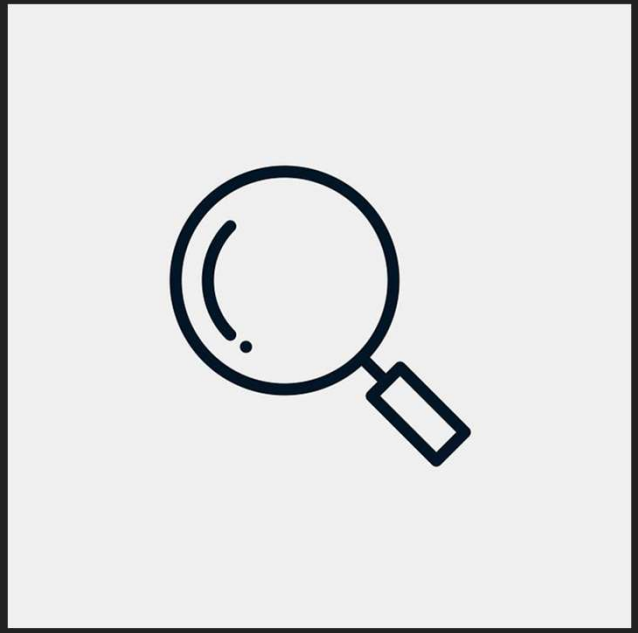
- All Parties Have Some Basic Files
  - Complaint
  - Exhibits
- Conference
  - Both Sides
- Request for Documents
  - Expert Requests
  - Asks for Evidence
  - Must be Provided
  - (Except Attorney Client Work Products and Communications



## Depositions

- Oral Examination of a Witness
  - Taken Under Oath
  - Attorney Questions Facts and Details
  - To Prepare for Trial
  - Can be Compelled by Subpoena

- What Not to Say
  - Don't Guess or Speculate
  - Don’t Offer Information NOT Requested



# When Can Depositions of Experts Occur?

| Federal | State |
| --- | --- |
| • A party may depose any person who has been identified as an expert whose opinions may be presented at trial.<br>• If a report is required, the deposition may be conducted only after the report is provided.<br>FRCP 26(b)(4)(A). | • Depositions and interrogatories of experts are only available on a showing of special circumstances:<br>1. where physical evidence is lost or destroyed, or<br>2. where some other unique factual situation exists such as proof that the information sought to be discovered cannot be obtained from other sources.<br>CPLR 3101(d)(1)(iii). |

# Trials

- Jury Trial
  - Jury Decides Merits of Case
  - Jury can Award Damages
    - Compensatory
    - Punitive
- Bench Trial
  - Decision by a Judge
  - Or, by a Panel of Judges

## What's the Scope of Expert Disclosures?

**Similarities:**

May state an opinion without first testifying to the underlying facts or data.

May be required to on cross examination.

See FRE 705 and CPLR 4515.

Must be disclosed to other parties in advance of trial.

See FRCP 26(a)(2)(A) and CPLR 3101(d).


# What's the Scope of Expert Disclosures?

**Differences:**

## The expert's report…

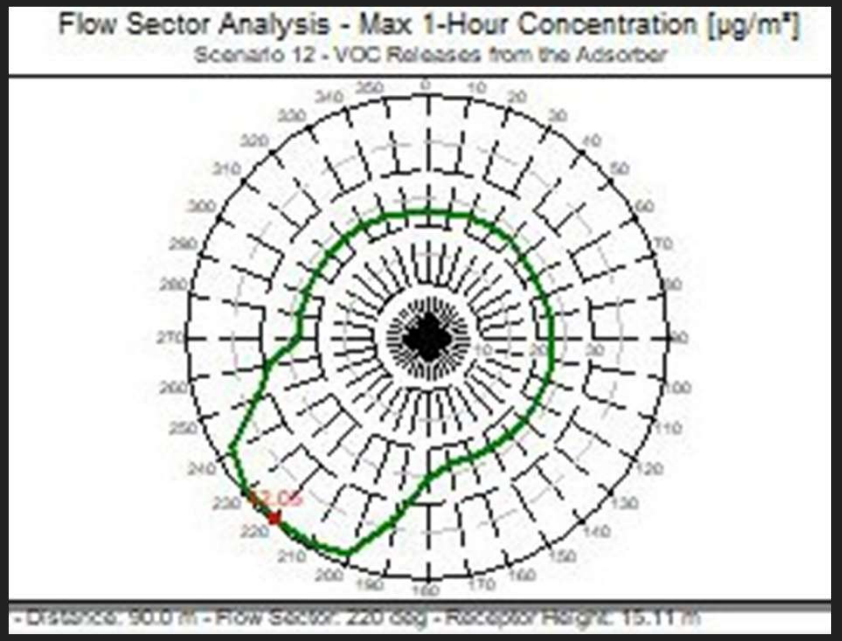
| Federal | State |
|---|---|
| Experts must prepare a written report, disclosed by a party to the other party, that contains:<br>1. A complete statement of all opinions the witness will express and the basis for them;<br>2. The facts/data considered by the witness in forming them;<br>3. Any exhibits that will be used to summarize or support them;<br>4. The witness's qualifications, including publications from the last 10 years;<br>5. A list of cases that the witness testified in as an expert in the last 4 years; and<br>6. A statement of compensation to be paid for the study or testimony.<br>FRCP 26(a)(2)(B). | No report must be disclosed. Upon request, a party only needs to disclose:<br>1. The subject matter of the expert's testimony;<br>2. The substance of the facts and opinion of the expert's testimony;<br>3. The qualifications of the expert; and<br>4. A summary of the grounds for the expert's opinion(s).<br>CPLR 3101(d)(1)(i). |

## When disclosure is required:

| Federal | State |
|---|---|
| At least 90 days before the date set for trial or for the case to be ready for trial, or within 30 days after the other party's disclosure if the evidence is solely intended to contradict or rebut evidence on the same subject matter. FRCP 26(a)(2)(D). | Must give "appropriate notice…" Defined by circumstances specific to each case.<br>CPLR 3101(d)(1)(i). |

## Expert Testimony

- Common Subject Matter Experts
  - Engineer
  - Geologist
  - Scientist



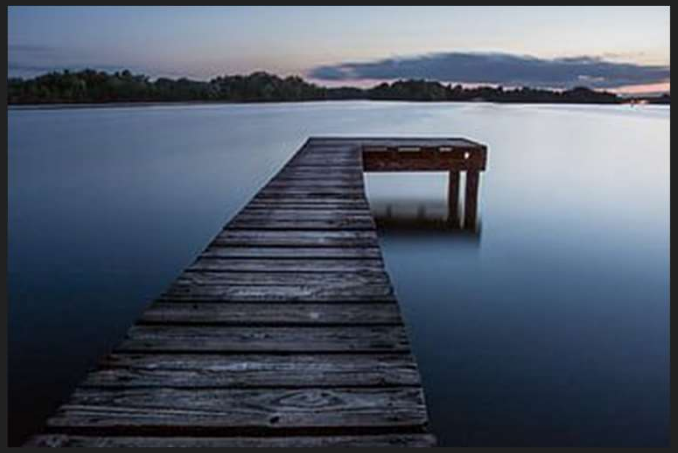

- In Our Upcoming Case Study
  - Engineer: Air Modeling Expert
  - Scientist: Industrial Hygiene / Health Exposure Expert
  - Geologist: Geology, Chemistry, Geochemistry & Hydrogeology Expert

## Settlement or Judgement and Potential Award

- Settlement
  - Least Expensive to Litigate
  - No One Ever Takes All
  - Reduces Risk of Losing All

- Jury Award
  - Possible Risk of Plaintiff Losing All
  - Upside of Plaintiff Gaining More
  - Starting with Compensatory Damages
  - And Getting a Punitive Damage Award

## Avoiding or Anticipating Litigation



- As A Scientist or Engineer
  - Always Follow Best Practices
  - Keep Impeccable Records
- Walk Away from Projects
  - If there is Any Question of Ethics
  - If there is Not Enough Time or Money to do the Job Right
- Anticipate Litigation in Contracts
  - Keep Your Errors and Omissions / Professional Liability Insurance Up to Date
  - More on Project-based and Other Types of Litigation to Come

# Case Study: Expert Geological Support for the Plaintiffs
# Were Residents Placed at Risk from Toxins Released from a Chemical Fire?


Chemical Plant

Fire

Legal Burden of Proof:
Under Alabama Law,
Did Plaintiff Create a
"Zone of Harm" ?

School

Residents with
Acute Exposure
Symptoms

# Potential Chemical Releases

Routine Operational Releases

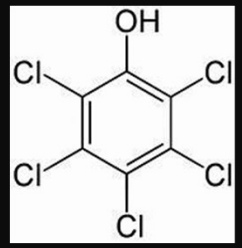
- Fugitives released during operations i.e., loading dissolvers
- Emissions from pollution control devices
- Anticipated by Permit

Non-permitted Releases

- Leaking equipment i.e., valves
- Uncontrolled releases i.e., fire

Releases from Fire

- Pentachlorophenol
  - Common Wood Preservative
  - Now Outlawed in the US
- Considered Non-flammable
- The Only Chemical Considered
- How did it burn?



# Initial Approach: Modeling Chemical Releases to the Air

USEPA guidance
or regulatory models used:

<u>Routine releases</u>

- AERSCREEN: Worst case analysis
- AERMOD: Hourly analysis

<u>Fugitive emissions</u>

- TANK and AERSCREEN
  - Worst-case analysis

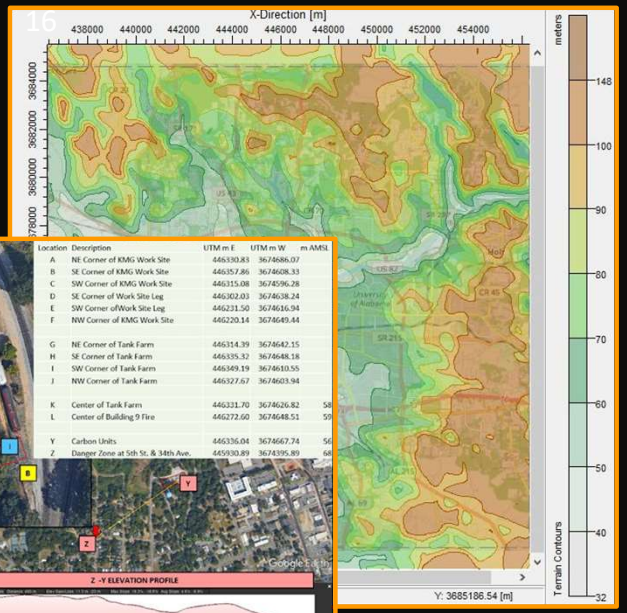
<u>Fire</u>

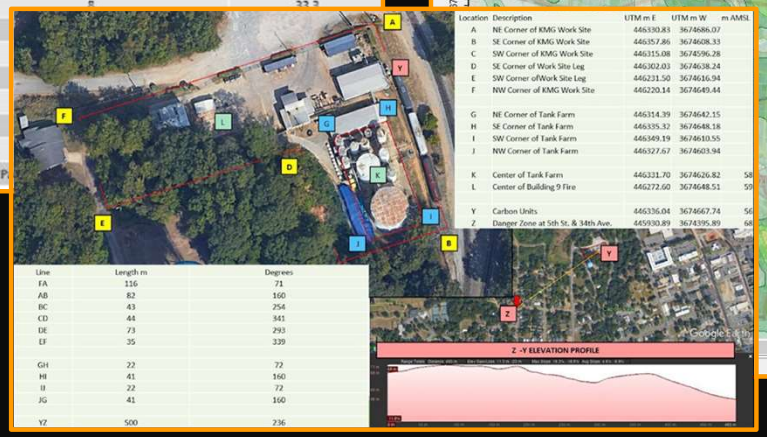
- CAMEO (NOAA/USEPA)
  - also used for worst-case analysis

2019 Worst Case Meteorological Conditions

| Date | Number of hours of calm conditions | % of calm conditions during the 24-hr. day |
|---|---|---|
| Jan. 15, 2019 | 6 | 25.0 |
| Feb. 15, 2019 | 0 | 0 |
| March 15, 2019 | 0 | 0 |
| April 15, 2019 | 15 | 62.5 |
| May 15, 2019 | 10 | 41.7 |
| May 30, 2019 | 8 | 33.3 |
| May 31, 2019 | 12 | 50.0 |
| June 15, 2019 | 8 | 33.3 |
| July 15, 2019 | | |
| August 15, 2019 | | |
| September 15, 2019 | | |
| October 15, 2019 | | |
| November 15, 2019 | | |
| December 15, 2019 | | |
| Note: | | |

Terrain around the plant (USGS): UTM zone




UTM Mapping

# Calculating Routine Fugitive Releases

VOC (1) Summary
PTE (2/3) 4.8 tons/year 16.76 lbs./hr.
Actual (4) 3.4 tons/year

HAPs (5) Summary – PTE
Toluene 0.039 tons/year 0.135 lbs./hr.
Benzene 0.014 tons/year 0.066 lbs./hr.
MIBK (6) 0.0012 tons/year 0.0044 lbs./hr.

HAPs Summary - Actual (4)
Toluene 0.041 tons per year (7)
Benzene 0.010 tons per year
MIBK 0.0009

tons per year Notes:
(1) VOC: Volatile Organic Compounds
(2) PTE: Potential to Emit
(3) Pulled from Air Permit
(4) Reported as fugitive emissions
(5) HAPs: Hazardous Air Pollutants
(6) MIBK: methyl isobutyl ketone aka 4-methyl-2-pentanone
(7) Exceeds PTE

| Routine Fugitive Releases: Worst Case Model Results | | |
|---|---|---|
| VOCs | 4.8 tons/year | 16.76 lbs./hr. |
| Toluene | 0.039 tons/year | 0.135 lbs./hr. |
| Benzene | 0.014 tons/year | 0.066 lbs./hr. |
| MIBK | 0.0012 tons/ year | 0.0044 lbs./hr. |

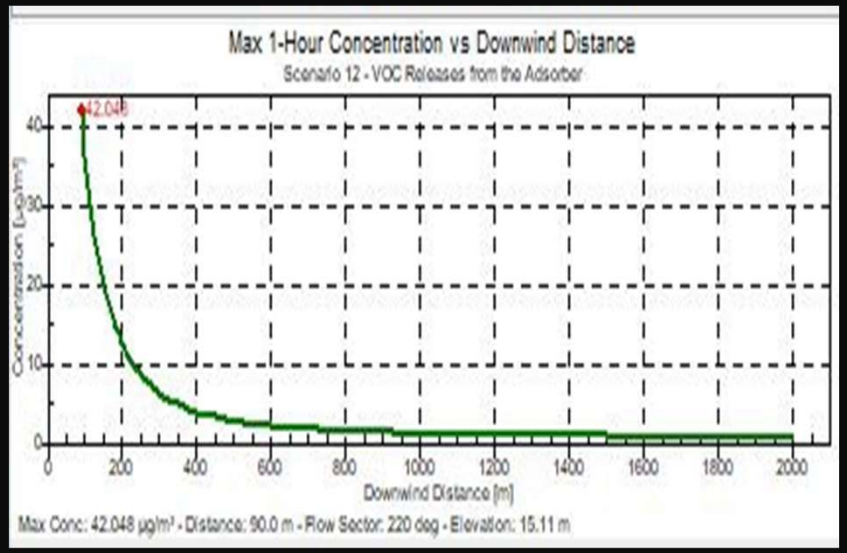
Notes:
(1) Emission rates are PTE values
(2) Base elevation 2860 hours of operation 175 ft.
(3) Exit temperature Ambient
(4) Height 8 ft.
(5) Modeled as an area source Area Source
(6) Area 106.67 ft. x 216.34 ft.
(7) Angle 160 degrees from North 446331.70 E-W
(8) Center of Tank Farm UTM 3674626.82 N-S

# Calculating VOC Releases from the Air Pollution Control Device (Air Permit)

VOC emission rate from adsorber stack 0.54 lbs./hr.

| | |
|---|---|
| • Removal efficiency | 90% |
| • Temperature | Ambient |
| • Exit velocity | 30.6 ft./sec. |
| • Inside diameter at exit | 0.167 ft. |
| • Height above grade | 8 ft. |
| • Base elevation | 175 ft. |
| • UTM (E-W) | 446336.04 m |
| • UTM (N-S) | 3674667.74 m |
| • Terrain | USGS – NED GEOTIFF |

Model Results




Impact of VOCs Releases of 1bs./hr. from the Air Pollution Control unit (Worst Case)

# Calculating Fugitive Releases from Leaking Equipment

Two Methods for Estimating Fugitive Emissions from Valves, Flanges, Pumps and Similar Sources

Method 1 - SOCMI (1) *Uses Industry Factors* 4.42 lbs./hr. Method 2 -

AP 42 (2) *Uses Leak Rates for Each Type of Source (3)*

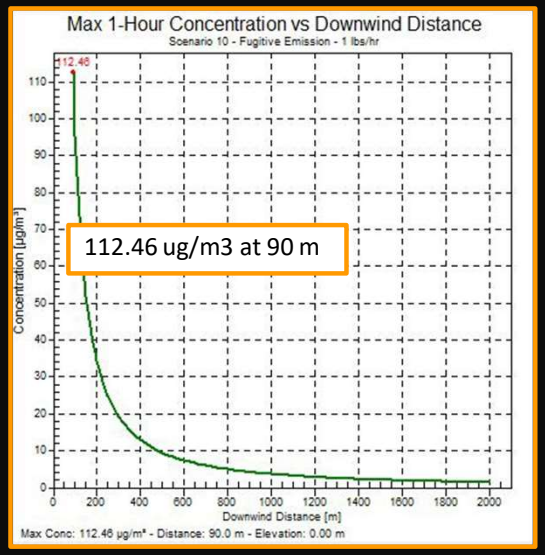
| | |
|---|---|
| Not Leaking | 1.61 lbs./hr. |
| Leaking (4) | 34.57 lbs./hr. |

Notes:

(1) Synthetic Organic Chemical Manufacturing Industry
(2) USEPA Chapter 7
(3) Sources estimated using site maps. Actual numbers may be different.

Useful for Worst Case Analysis

Model Results




Worst Case Routine Fugitive Releases in 1bs./hr.

# Calculating Releases of Chemicals to the Air from the Fire: Conditions That Day

## Atmospheric Conditions

- Clear sky
- Sunny
- Unstable atmosphere

## Meteorological Conditions

| Time | Wind speed (mph) | Wind direction (degrees) |
|---|---|---|
| 15:53 | 8 | 290 |
| 16:53 | 7 | 300 |
| 17:53 | 7 | 320 |
| 18:53 | 0 | 000 |
| 19:53 | 0 | 000 |

Source: NOAA U.S. Local Climatology Data (LCD)
Station: Tuscaloosa Airport ASOS, AL US WBAN: 72228693806

## Plume Conditions

- Approximately 50 m-80 m high due to intense heat
- Approximately 80 m diameter of plume at high point
- Incomplete combustion (see black smoke) leading to the formation of submicron aerosols
- Heavy gas dispersion

# Hypothetical Worst-Case Release Scenario of 21,000 lbs. of HCl to Air from the Fire

## INPUT DATA

CHEMICAL DATA:

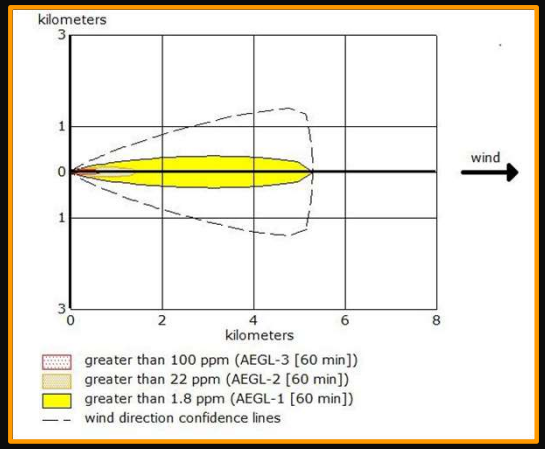
Chemical Name: HYDROGEN CHLORIDE
CAS Number: 7647-1-0 Molecular Weight: 36.46 g/mol
AEGL-1 (60 min): 1.8 ppm
AEGL-2 (60 min): 22 ppm AEGL-3 (60 min): 100 ppm
IDLH: 50 ppm
Ambient Boiling Point: -85.0° C
Vapor Pressure at Ambient Temperature: greater than 1 atm Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 8 miles/hour from 290° true at 3 meters
Ground Roughness: urban or forest
Cover: 0 tenths Clou
Air Temperature: 70° F Stability Class: C
No Inversion Height Relative Humidity: 5%

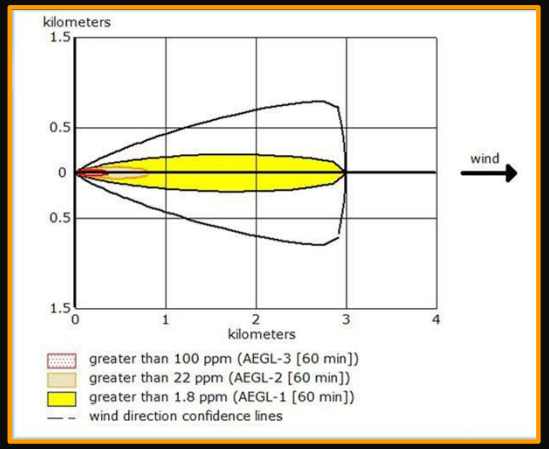
SOURCE STRENGTH:

Direct Source: 21000 pounds/hr. Source Height: 50 m
Release Duration: 60 minutes
Release Rate: 159 kilograms/min Total Amount Released: 9,525 kilograms




Impact Area for 21,000 lbs. Release Over a One-Hour Period

| | |
|---|---|
| AEGL-3 | Death, life-threatening health effects |
| AEGL-2 | Irreversible or lasting adverse effects, impaired ability to escape |
| AEGL-1 | Discomfort, irritation, asymptomatic non-sensory effects |




Impact Area for 21,000 lbs. Release Over a Three-Hour Period

- Over One-hour, effects can reach as far out as 5 km or 3 miles. Over 3 hours, effects can reach as far out as 3 km or almost 2 miles.

# Actual Release of 2,700 lbs. of HCl to Air from the Fire

## INPUT DATA

CHEMICAL DATA:

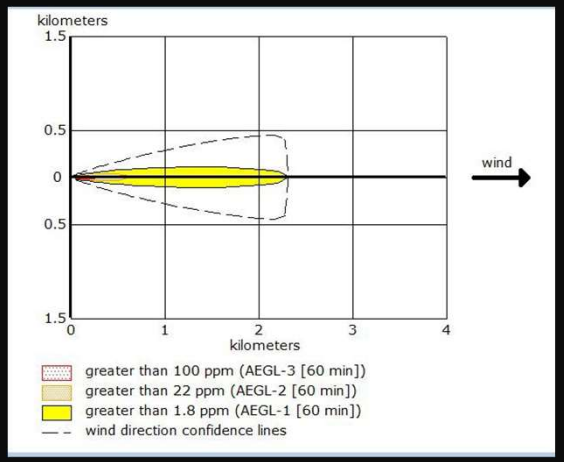
Chemical Name: HYDROGEN CHLORIDE
CAS Number: 7647-1-0 Molecular Weight: 36.46 g/mol
AEGL-1 (60 min): 1.8 ppm
AEGL-2 (60 min): 22 ppm AEGL-3 (60 min): 100 ppm
IDLH: 50 ppm
Ambient Boiling Point: -85.0° C
Vapor Pressure at Ambient Temperature: greater than 1 atm Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 8 miles/hour from 290° true at 3 meters
Ground Roughness: urban or forest
Cover: 0 tenths Clou
Air Temperature: 70° F Stability Class: C
No Inversion Height Relative Humidity: 5%

SOURCE STRENGTH:

Direct Source: 21000 pounds/hr. Source Height: 50 m
Release Duration: 60 minutes
Release Rate: 20.4 kilograms/min
Total Amount Released: 1,225 kilograms




Impact Area for 2,700 lb. Release Over a One-Hour Period

| | |
|---|---|
| AEGL-3 | Death, life-threatening health effects |
| AEGL-2 | Irreversible or lasting adverse effects, impaired ability to escape |
| AEGL-1 | Discomfort, irritation, asymptomatic non-sensory effects |

- Over the one-hour fire, effects would be expected to reach well over 2 km or well over 1 mile away.

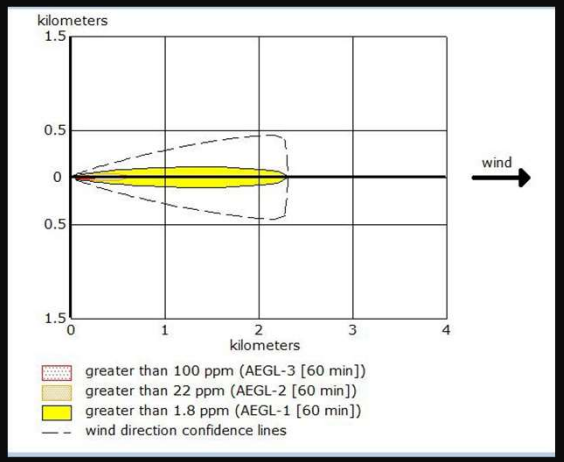
# Notes and Challenges

## Closest Receptors

1. WNW / House at MLK & 3rd / 446211.21 e / 3674638.59 n / 225ft from fire at Bldg. 9 / 261 deg. / 588 ft from center of fugitives
2. WSW / House at 314? MLK / 446160.12 e / 3674578.67 n / 445 ft from fire at Bldg. 9 / 238 deg. / 595 ft from center of fugitives
3. E / Apartments / 446518.95 / 3674621.82 / 96 deg. / 625 ft from center of fugitives
4. S / House on 6th / 446379.53 / 3674389.67 / 161 deg. / 846 ft from center of fugitives
5. Corner of 34th and Fifth is 500m: there are two blocks of houses between that and MLK southwest of the plant

## Challenges

1. The mass of PCP burned in the fire has not been positively established
2. Some literature suggests that PCP may sublimate – go directly from a solid to a gas like snow melting or dry ice melting – under certain conditions, creating the option for expanding the models directly to predict PCP exposure as a result of the fire




Impact Area for 2,700 lb. Release Over a One-Hour Period

| | |
|---|---|
| AEGL-3 | Death, life-threatening health effects |
| AEGL-2 | Irreversible or lasting adverse effects, impaired ability to escape |
| AEGL-1 | Discomfort, irritation, asymptomatic non-sensory effects |

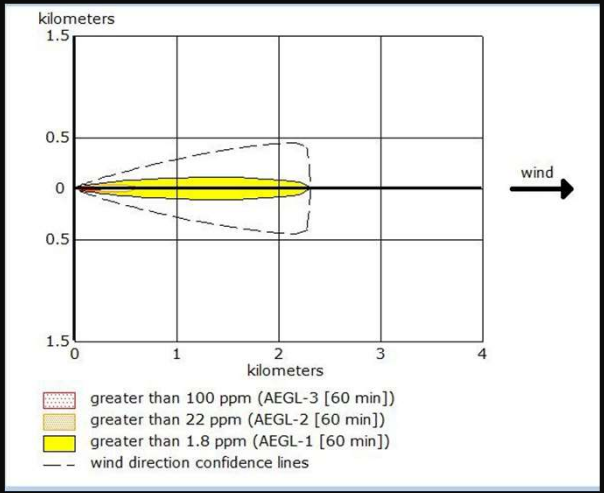
- Over the one-hour fire, effects would be expected to reach well over 2 km or well over 1 mile away.

# Initial Conclusions

1. KMG fugitives have been and continue to be responsible for concentrations over the VOC Odor Threshold.

2. Benzene emissions from KMG have presented and continue to present an unacceptable level of increased cancer risk to nearby receptors.

3. Hydrochloric Acid, submicron particulate matter, and possibly other organic chemicals including but not limited to PCP and its possible sublimates, were released as a result of the May 29, 2019 fire and likely traveled well over a mile away.




| | |
|---|---|
| AEGL-3 | Death, life-threatening health effects |
| AEGL-2 | Irreversible or lasting adverse effects, impaired ability to escape |
| AEGL-1 | Discomfort, irritation, asymptomatic non-sensory effects |

# AERSCREEN Model Results

| Contaminant | Nature of release | Emission rate (lbs./hr.) | 1-hr ground level concentration at 90 m (Worst case) ug/m3 | Conclusions |
|---|---|---|---|---|
| VOCs | Fugitive releases | 16.76 | 1884.8 | • **Conc. above odor threshold (1-0.1 ug/m3)**<br>• **Conc. above odor threshold of contaminants identified in lab analysis (0.88 - 10 ug/m3)** |
| VOCs | Valves, flanges, pumps and similar sources | 4.42 lbs. /hr. (SOCMI)<br>1.61 lbs./hr. (no leak) to 34.57 lbs./hr. (leaking) | 497.1<br>181.1 to 3907.9 | |
| VOCs | Releases after the use of air pollution control device | 0.54 | 22.71 | |
| VOCs | Releases when air pollution control device is not working | 5.4 | 227.1 | |
| Benzene | Fugitive releases | 0.066 | 7.42 | • **Conc. above 0.36 ug/m3 EPA RSL5 (res.) for cancer** |
| MIBK | Fugitive releases | 0.0044 | 0.50 | Conc. less than inhalation exposure limit |
| Toluene | Fugitive releases | 0.135 | 15.18 | Conc. less than inhalation exposure limit |

# Residential Impact of Fugitive Releases

| House | Distance (ft.) | Max. 1-hr. Conc. for 1 lbs./hr. (ug/m3) | VOCs (ug/m3) | Benzene (ug/m3) | MIBK (ug/m3) | Toluene (ug/m3) |
|---|---|---|---|---|---|---|
| House at MLK & 3rd | 588 | 40.12 | **672.41** | **2.65** | 0.18 | 5.42 |
| House at 314? MLK | 595 | 39.45 | **661.18** | **2.60** | 0.17 | 5.28 |
| E / Apartments | 625 | 36.76 | **616.10** | **2.43** | 0.16 | 4.96 |
| S / House on 6th | 846 | 23.89 | **400.40** | **1.58** | 0.11 | 3.23 |
| To the north at the end of river | 1200 | 14.63 | **245.20** | 0.97 | 0.06 | 1.98 |
| Corner of 34th and 5th | 1640 | 9.48 | **158.88** | 0.63 | 0.04 | 1.28 |

Note: The impact of emission from the air pollution control device and fittings is not included. The above VOC concentrations are likely to increase if the impact of VOC emissions from air pollution control device and fittings is included.

# Cancer Risk Analysis for Benzene

Cancer risk due to inhalation = Concentration in air x Unit risk factor

1 hr. worst case ground level concentration of benzene due to fugitive emissions is 7.2 ug/m3.

The annual concentration is approximately 0.72 ug/m3 using the factor given in the AERSCREEN manual.

Notes: (1) The AERSCREEN program does not calculate annual concentration for area sources. Fugitive emissions are treated as an area source for modeling.

(2) Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure (PDF) (45 pp, 261 K)

(3) USEPA Inhalation Unit Risk: A range of 2.2 x 10-6 to 7.8 x 10-6 is the increase in the lifetime risk of an individual who is exposed for a lifetime to 1 µg/m3 benzene in air.

(4) Source: Risk Assessment Guidelines, California Environmental Protection Agency, Feb. 2015

| Source | Fugitive emissions (PTE) from routine operation | Fugitive emissions from valves, flanges, pumps and similar sources | Releases when air pollution control device is not working |
|---|---|---|---|
| Benzene Conc. ug/m*3 | 0.72 | 49.71% benzene | 22.71% benzene |
| Risk due to inhalation | 1.6 x 10-6 to 5.6 x 10-6 | ? ? | ? ? |
| **Excess e10-6 Cancer Risk** | **1.6 to 5.6 chances per million.** | **? High ?** | **? High ?** |

Recommended Factors to Convert Maximum 1-hour Avg. Concentrations to Other Averaging Periods (U.S. EPA, 2011, 1995a; ARB, 1994).

| Averaging Time | Range | SCREEN3 Recommended | AERSCREEN Recommended |
|---|---|---|---|
| 3 hours | 0.8 -1.0 | 0.9 | 1 |
| 8 hours | 0.5 -0.9 | 0.7 | 0.9 |
| 24 hours | 0.2 -0.6 | 0.4 | 0.6 |
| 30 days | 0.2 -0.3 | 0.3 | |
| Annual | 0.06 -0.1 | 0.08 | 0.1 |

# Calculating Releases of Chemicals to the Air from the Fire: How Much Could Have Burned?

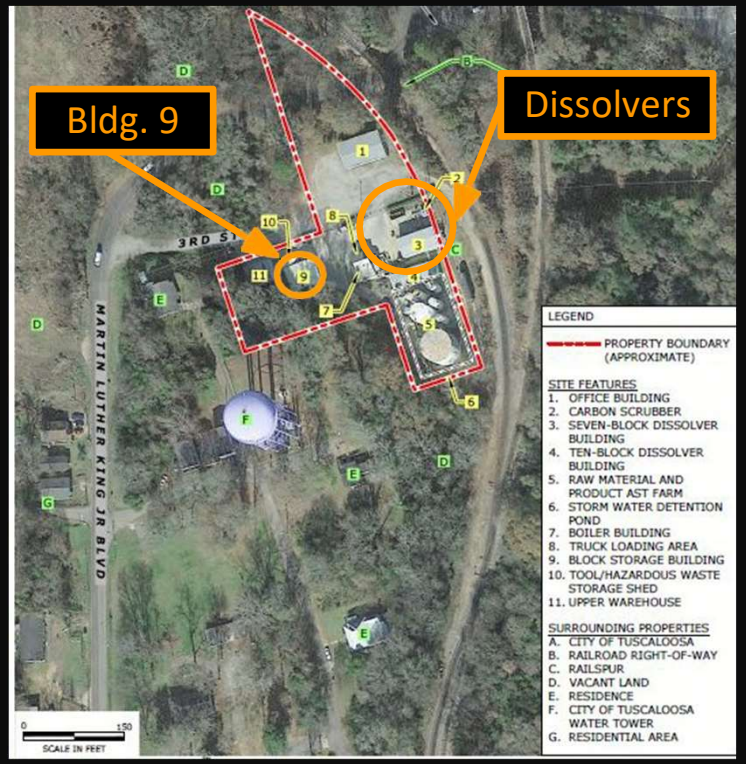
## Worst Case?

DT-40 is produced on two different production lines. The first line is a seven-block dissolver that dissolves 2000 lbs./block of PCP in 20500 lbs. of organic solvent at 200 degrees F producing 3000 to 3500 gallons of DT-40 per batch. The second line is a ten-block dissolver that dissolves 2000 lbs./block of PCP in 30000 lbs. of organic solvent at 200 degrees F producing 5000 to 5500 gallons of DT-40 per batch. It appears that the emissions from the entire process go through a carbon scrubber. The fire was started from a contaminated scrubber unit and therefore could have involved the entire assembly line. While the amount of carbon may have a limited impact on the mass of contaminants released, the contaminants released are from the combustion of PCP, organic solvents and DT-40. Worst case could have involved both production lines during fire, in which case the source chemicals for the fire would have involved following the amount of the following chemicals given the production of DT-40 per working day :

- 34000 lbs. of PCP;
  50500 lbs. of organic solvents; equaling about
  84,505 lbs. of DT-40

## May 31, 2019 Fire in (Storage) Building 9

However, the fire that ensued in Building 9 was said to have started an overheated spent carbon unit, unlikely as it seems, and then involved an unidentified number of 2,000 lb. blocks of PCP.



# Calculating Releases of Chemicals to the Air from the Fire: What Was Released?

Hydrochloric Acid, as follows:

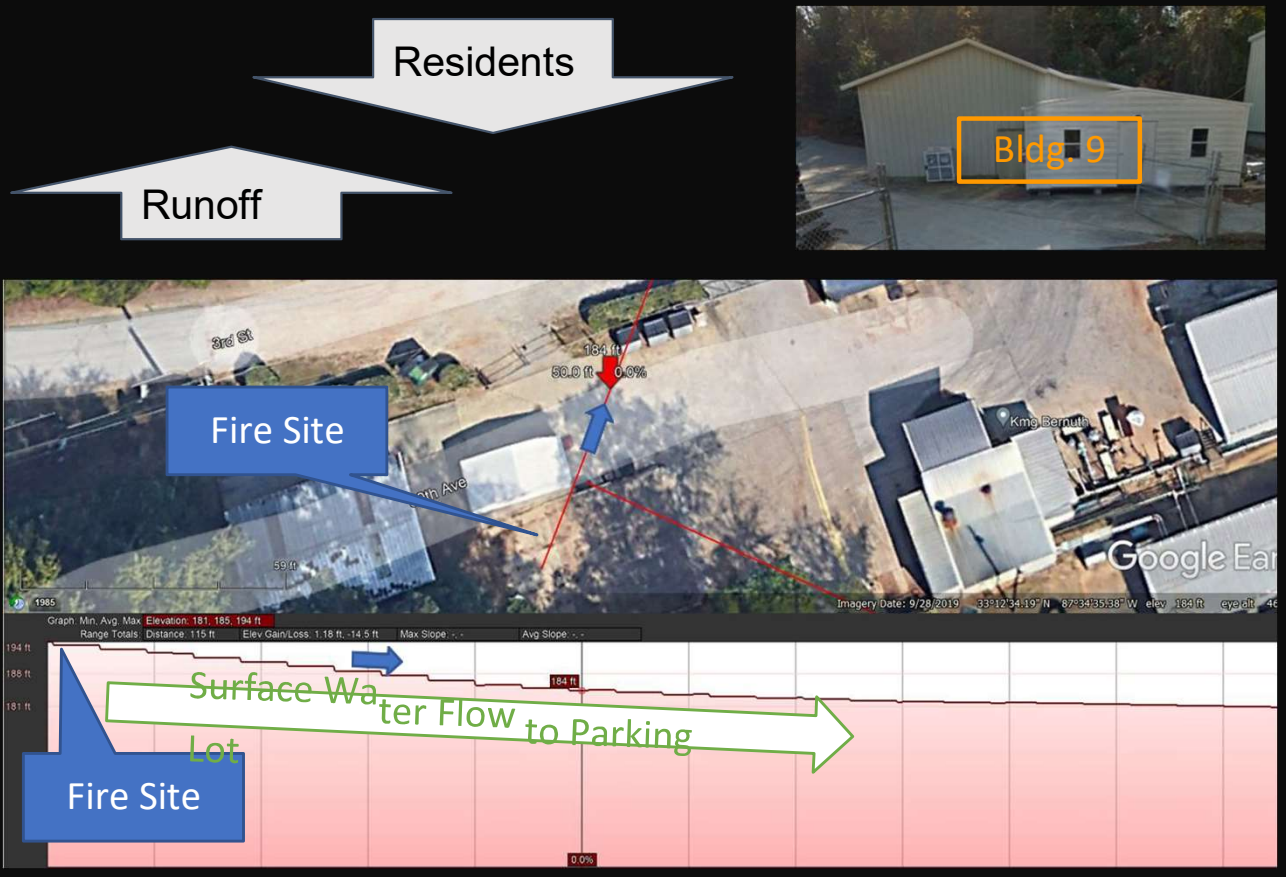
$4C_6HCl_5O + 17O_2 \rightarrow 2H_2O + 8CO_2 + 2OCl$

$OCl + \text{Organic Solvents} \rightarrow HCl + \text{-------}$

In the Building 9 Fire on May 31, 2019:

Approx. 2700 lbs. of HCl was released.

*So What? Wouldn't the Fire Protection Water just run downhill, away from the residents?*



# So Why is the Geologist Still Bothering with All this Air Stuff?

Fire Site Elevation = 192 Feet AMSL Office Road Elevation = 186 AMSL Firewater would have drained toward the parking lot.

Embankment Road Elevation = 197 Feet AMSL

Firewater could not have drained uphill toward the embankment road.

The water from the fire could not be the source of any water in the collection pond.

Consider the Chemistry, Fate and Transport of Suspected Contaminants

1. Research showed that while solid Pentachlorophenol doesn't burn, it thermally breaks down to in the presence of Oxygen to Hydrochloric Acid, as follows:

   $4C_6HCl_5O + 17O_2 \rightarrow 2H_2O + 8CO_2 + 20OCl$

   And $OCl + H_2O$ will form HCl gas + $ClO_2$ Gas
3. $ClO_2$ gas is greenish in color, which was reported by the as a cloud headed up the hill
4. Exposed residents close to the green gas ClO cloud experience burning
5. That symptom would be expected by exposure to the colorless hydrochloric acid gas

And

6. Research showed that the solid Pentachlorophenol blocks dissolved into solvents
7. Likely contained up to 10% Phenol, Dioxins and Furans
8. Which, if present, would be transported by the particulate matter in the smoke plume

## Still No Smoking Gun Yet, Court Allows Plaintiff One Day of On-Site Sampling

Sampling Plan

Air:

Pentachlorophenol + Organic Solvents Using Very Technical Sampling Trains

[NOTE: Defendant shut processes down in violation of court order, so results = nil]

Soil On-site:

1. Fire Site (excavated and backfilled essentially = background)
2. Embankment 3 Feet above ground near to fire
3. Two samples close to the downwind property boundary on the day of the fire

Analyzed for Chloride, pH, Semivolatiles, and Dioxins and

# Still No Smoking Gun Yet, Court Allows Plaintiff One Day of On-Site Sampling

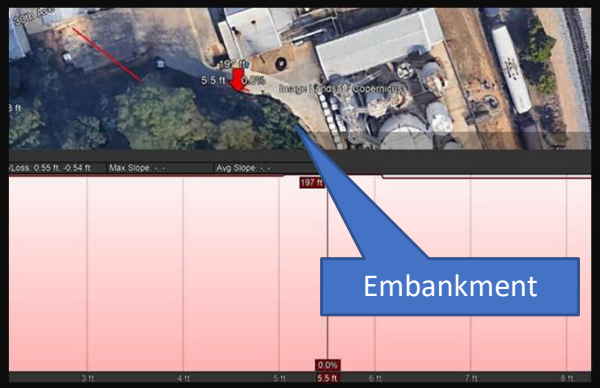
| Location | Description | PCP ug/kg | Dioxins & Furans TEQ<br>250 Residential<br>1,500<br>Industrial |
|---|---|---|---|
| TEQ Th<br>E Val<br>Co<br>Soil | ousands of Times Greater than Residential<br>ues = Estimated – Cannot even be Limits used for<br>mpounds with Highest Levels are TEQ Estimated<br>is Much More Toxic Than Can Even Be Measured | | |
| CP-1 | Collection Pond NE Corner | 39,000 | 31,000 |
| CP-1 Dup | Duplicate of CP-1 | 21,000 | 32,400 |
| CP-2 | Collection Pond NW Corner | 1,200,000 | 19,800 |
| EB-1 | Embankment | 280 | 110 |
| FS-1 | Fire Site | 25 | 5.30 |

| Parameter | CP-1 | | CP-Dup | | CP-2 | EB-1 |
|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | 441 | | 495 | | 238 | 2.66 |
| 1,2,3,7,8-PeCDD | 6890 | | 6730 | | 3810 | 31.7 |
| 1,2,3,4,7,8-HxCDD | 12400 | | 11900 | | 8110 | 38.1 |
| 1,2,3,6,7,8-HxCDD | 38700 | | 36900 | | 22600 | 125 |
| 1,2,3,7,8,9-HxCDD | 25600 | | 23900 | | 15100 | 104 |
| 1,2,3,4,6,7,8-HpCDD | 424000 | E | 404000 | E | 249000 | 1480 |
| OCDD | 564000 | | 511000 | | 206000 | 11500 |
| 2,3,7,8-TCDF | 245 | | 329 | | 333 | 1.03 |
| 1,2,3,7,8-PeCDF | 1440 | | 1710 | | 1780 | 5.10 |
| 2,3,4,7,8-PeCDF | 1730 | | 2010 | | 1670 | 5.53 |
| 1,2,3,4,7,8-HxCDF | 15900 | | 17600 | | 14100 | 36.7 |
| 1,2,3,6,7,8-HxCDF | 16200 | | 19800 | | 18200 | 43.0 |
| 1,2,3,7,8,9-HxCDF | 4100 | | 4510 | | 2800 | 43.3 |
| 2,3,4,6,7,8-HxCDF | 26100 | | 30600 | | 18200 | 60.1 |
| 1,2,3,4,6,7,8-HpCDF | 359000 | E | 409000 | E | 233000 | 939 |
| 1,2,3,4,7,8,9-HpCDF | 42300 | | 47200 | | 24800 | 109 |
| OCDF | 1120000 | E | 1190000 | E | 368000 | 3520 |
| Total TCDD | 9360 | | 12700 | | 11500 | 15.9 |
| Total PeCDD | 34700 | | 41400 | | 32100 | 94.1 |
| Total HxCDD | 175000 | | 180000 | | 99100 | 389 |
| Total HpCDD | 596000 | E | 576000 | E | 345000 | 2400 |
| Total TCDF | 32000 | | 45000 | | 29800 | 76.5 |
| Total PeCDF | 157000 | | 198000 | | 127000 | 247 |
| Total HxCDF | 531000 | | 581000 | | 384000 | 855 |
| Total HpCDF | 1420000 | E | 1510000 | E | 680000 | 2860 |
| Total PCDD | 1380000 | | 1320000 | | 694000 | 14400 |
| Total PCDF | 3260000 | | 3530000 | | 1590000 | 7550 |
| Toxic Equivalency (TEQ) | 31000 | | 32400 | | 19800 | 110 |

# Still No Smoking Gun Yet, Court Allows Plaintiff One Day of On-Site Sampling

Road Elevation = 197 Feet AMSL
Embankment Sample Elevation = 200 Feet AMSL. The color of the fire plume indicated particulate matter which is a likely transport mechanism for airborne dispersion. Chemicals are known to adsorb onto particulate matter supporting the airborne transport mechanism.

Given that firewater did not drain toward the embankment or toward the residents, Dioxins detected in the dry saprolite could have only been deposited through airborne deposition.




## Ok, So the Stuff Was Released On Site. How Do You Know It Spread to Residents?

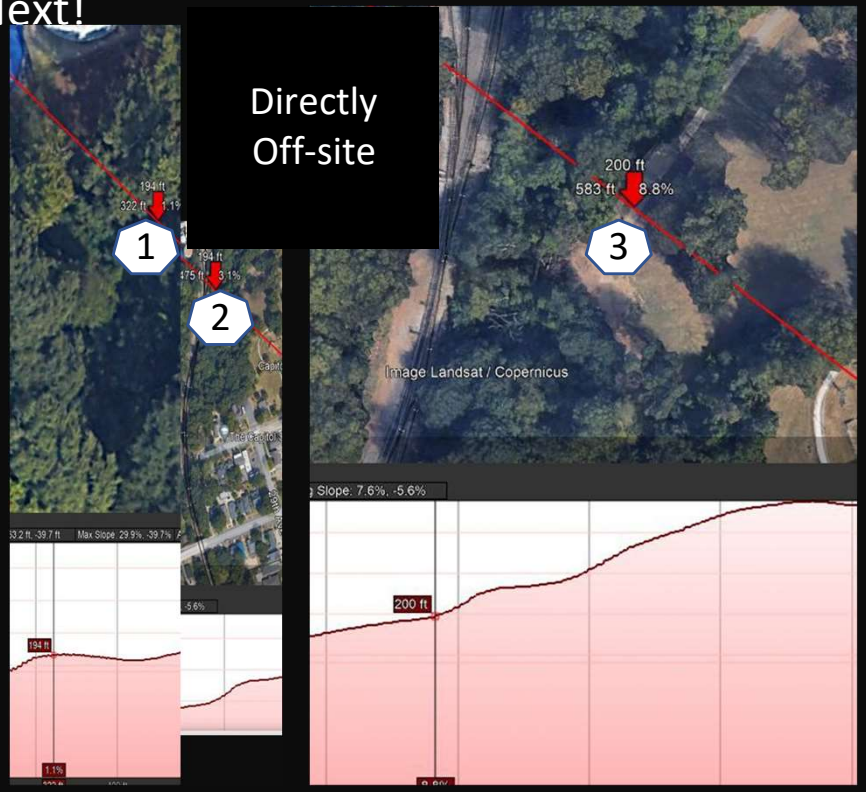
Well, remember:

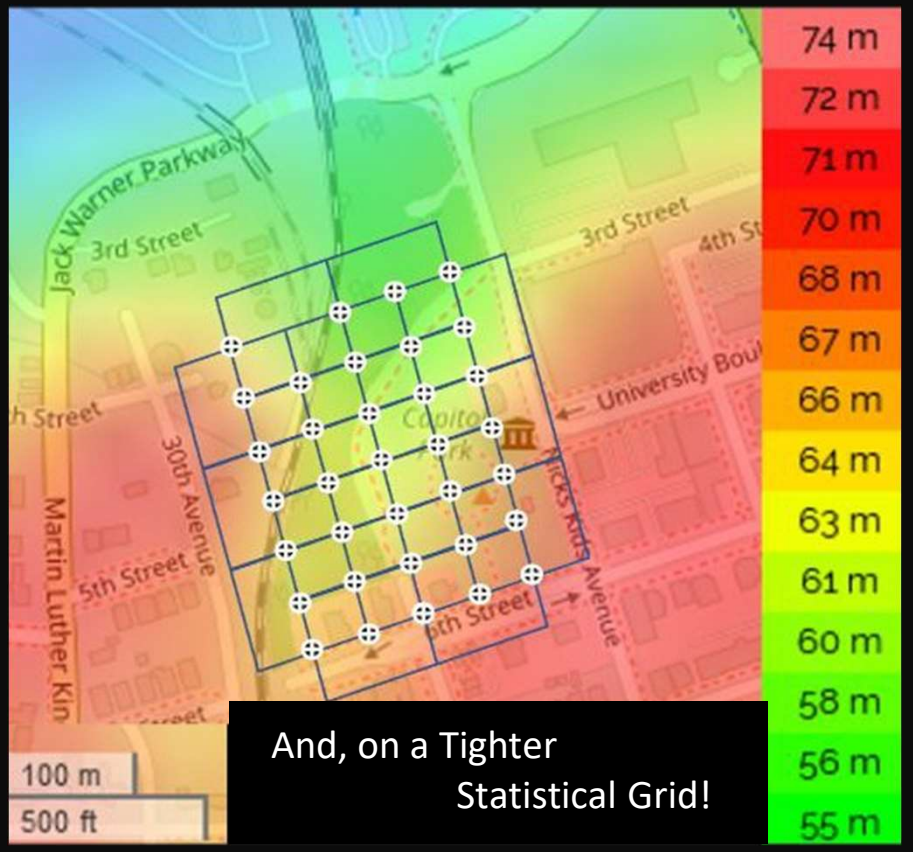
1. Resident Reports of a Green Smoke Plume Headed Their Way (shown)?
2. Acute Symptoms Experienced by Residents?
3. The breakdown of Pentachlorophenol into ClO and HCl gases?
4. And the Soil pH Samples that Might Indicate off Site Migration?

pH Isoconcentration lines indicated in yellow clearly show gas migration.

# Well, that Doesn't Prove that the Really Bad Stuff Got Off Site, Does It?

No, But We're Going to Get That Data Next!



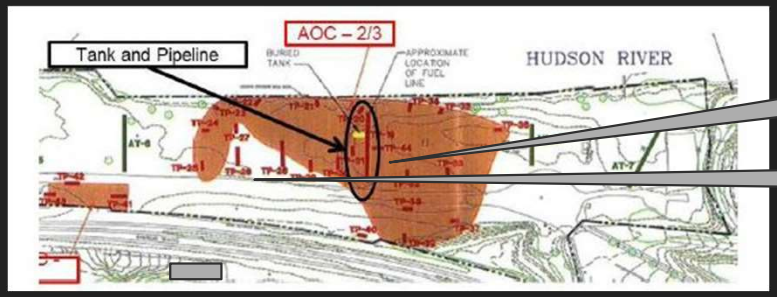
Now do You Want to Settle?

Oh yeah, and I almost forgot to ask, what was the registration number of the licenced geologist that was collecting your split samples who you were going to have testify?

## Anything You Do Might End Up In Court

- Assessment
- Data Validation
- Procedures
- Data Interpretation
- Torts
- Insurance Portfolios
- Defective Products
- Projects
- Compliance

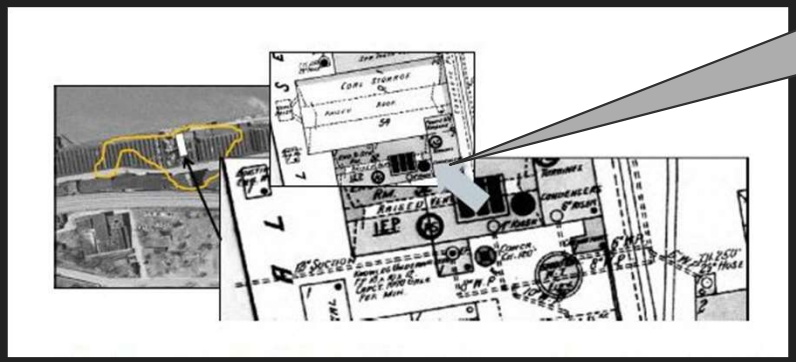
# Assessment: Source Contention



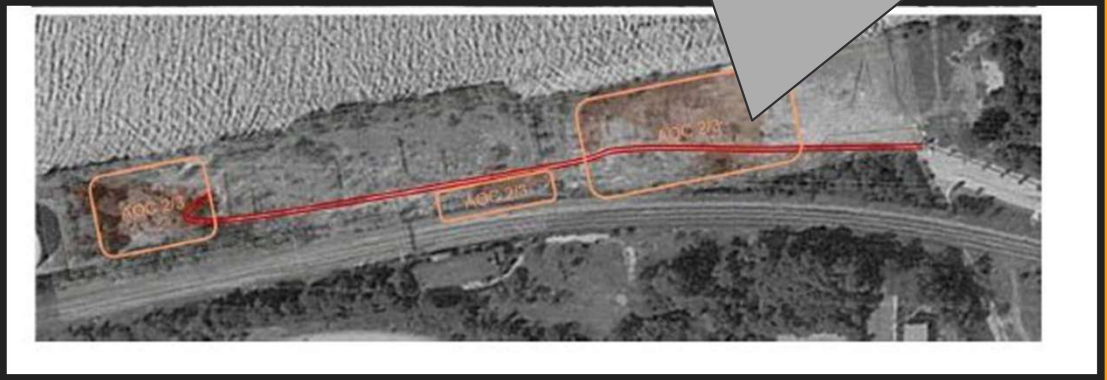

Brownfield Plaintiff Abandoned Tank and Pipe for Spill

Actual Location of Two Former 10,000 Gallon Fuel Oil Tanks

Pipes in the Source Area were used for Coal-generated Steam



Releases were from Uncontrolled Dumping from Roads



# From Source Security through Sample Collection, Quality Control and Data Validation

**Chain of Custody Record**

| | | |
|---|---|---|
| **Project No.** | **Project Title** | |
| | | **Organization** |
| **Shipping Container No.** | | **Contact** |
| **Field Samplers:** *print* | *signature* | **Address** |

| Date | Time | Site/Location | Sample Type | Sample ID | Remarks |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

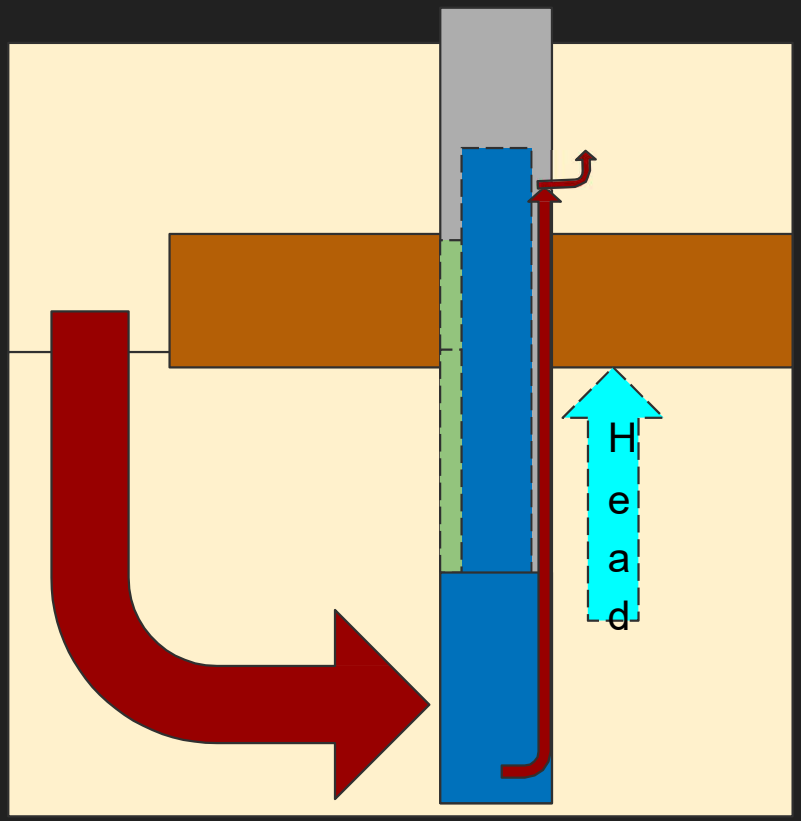
| Relinquished by (*print and signature*): | Received by (*print and signature*): | **Comments** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Figure 8.2 Example Field COC Form.**

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 2-Fluorophenol | 93 | | 25-120 |
| Phenol-d6 | 94 | | 10-120 |
| Nitrobenzene-d5 | 91 | | 23-120 |
| 2-Fluorobiphenyl | 60 | | 30-120 |
| 2,4,6-Tribromophenol | 74 | | 10-136 |
| 4-Terphenyl-d14 | 58 | | 18-120 |

- Methods
- Data Quality Objectives
- Blanks
- Dupes
- Matrix Spike
- Matrix Spike Dupe
- Recoveries

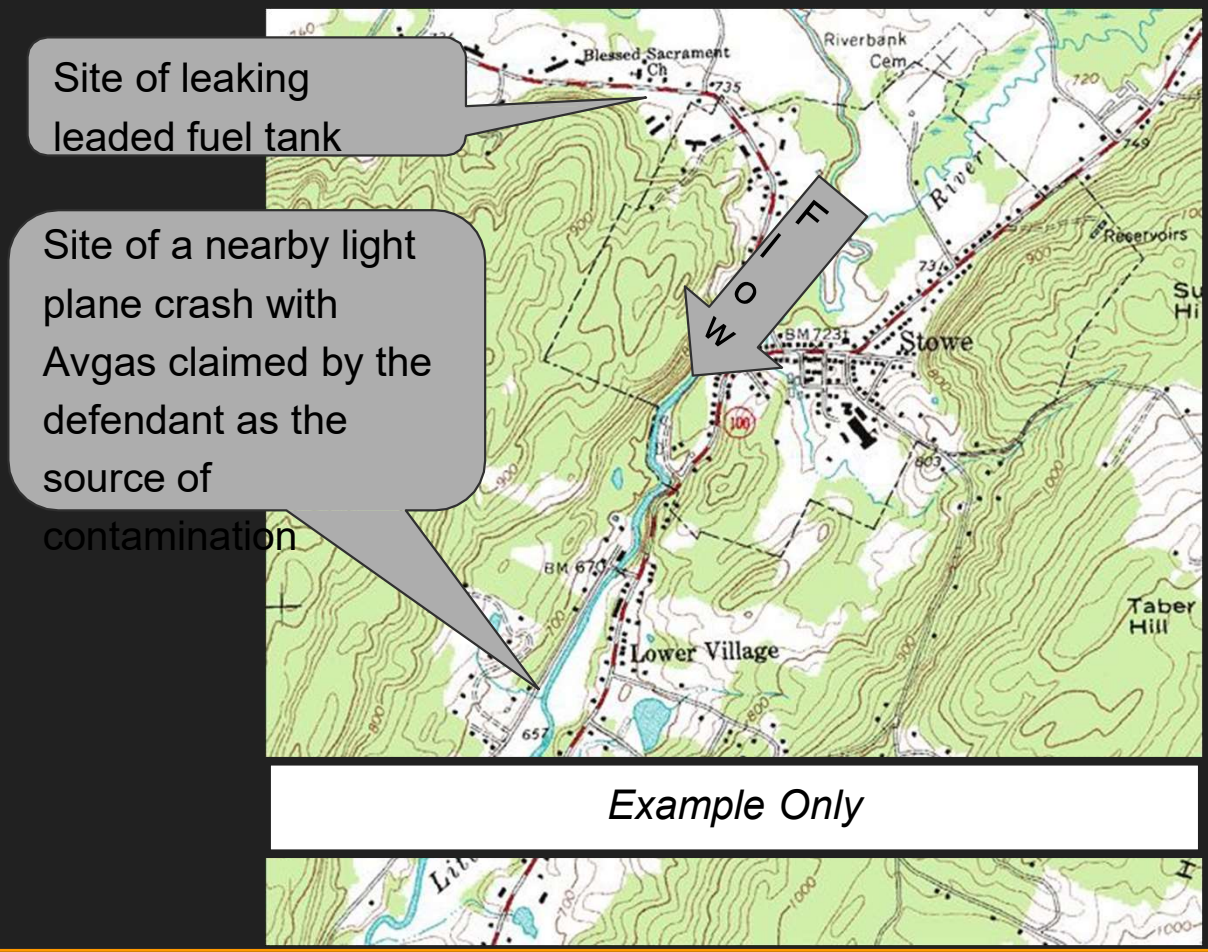
Procedures:




- Improperly installed casing leaking upwards into shallow aquifer.
- Anomalies from sampling the dirtyest wells first and spreading contamination to the clean upgradient wells

## Data Interpretation Defenses

- meant to confuse judge and jury…Yes, this really did happen in court the day before Christmas Eve when the case was to be decided - after I was dismissed as the plaintiff's expert.



# Torts

- Did your organization release hazardous chemicals
  - from facility operations?
  - during a project?
- Did the chemicals hurt someone?
  - if so they may seek damages

# Insurance Portfolio Review

- Major Manufacturer Sues Insurance Company For All its Potential Known and Unknown Environmental Liability ($800 Million in the 1990s)
- Analysis based on Investigation Assumptions using Probabilistic Cost Modeling (propr to the ASTM Standard)
- Excess Carriers ( a Large Group) Needed an Analysis of the Numbers
- Team was Assembled : Geologists Examined Sources, Investigations and Releases using Real Data.
- Engineers Estimated Liability Using Likely Cleanup Scenarios on which a Settlement Could be Based.

# Defective Product

- Site Investigation at a Major Superfund Site in Region V Determined the Source of TCE was the ‘Oiling’ of Roads with Still Bottoms
- The plaintiff sued the Equipment Manufacturer for Faulty Instructions
- Geologists Determined the Extent of the Release and Conducted the Groundwater Modeling Necessary for the Engineering Design. Engineers Determined the Amount of Damages Associated with the Cleanup.
- The Judge and Jury Ruled for the Defense on the Grounds the the Plaintiff Should Have Known it was breaking the Law.
- A Great First Case Because the Outcome Was Not Based On Geology!


Notes:

1. Worked with Litigators, Not Environmental Attorneys.
1. Court Qualified in Geology, Chemistry, Hydrogeology and Geochemistry.
1. That didn’t stop the Defense Attorneys from Attacks in Depositions
1. The attacks to trip the experts up during testimony at trial continued, a common practice, ao its best to prepare with your litigators!

## Project Assistance

- Simple Cost Recovery Settlements
  - Construction & Demolition Waste Disposed of as Hazardous ($600k)
  - Municipal Waste Shipped to Hazardous Landfills ($300k)
  - New York State Hazardous Waste Disposal Tax Misapplied ($250k)

- Geologists wirth Project Management Skills Can Help
  - As long as you are not designing anything or testifying to costs of implementing engineering solutions

## More Project Assistance

- Geologists with Project Management Skills that Spend a Lot of Time Can Working with Attorneys and Business Managers Can Also Help with Environmental Compliance
  - A Major Beverage Manufacturer Required Help with Five-year Risk Management Planning Updates
  - 36 were missing permits and were out of Compliance for 5 years
  - 36 facilities x 365 days x 5 years x $25,000/day = $1.6 Billion!!
  - Worked with Outside Counsel to Self Report, Implementing a Management System and Reducing fines to just over $1 Million

## Summary and Conclusions

1) Understand Litigation

1) Maintain Confidentiality

1) Provide Sound Technical and Ethical Support to Plaintiffs and Defendants;

1) Know the Your Work on Any Project Might be Litigated at Any Time

Questions

Thomas J. Morahan,
P.G.

Jacob H. Zoghlin, Esq.

Learning
Assessment

1. Attorney Work Products are not Discoverable.

True or False

2. You are a geologist in a cost recovery matter. You are asked to testify about certain costs including

- - costs incurred for improper disposal based on the chemistry of the waste, provided they have the appropriate expertise;
- - costs incurred in the execution of a project they managed; and
  - the validity of costs of a proposed groundwater treatment system .

Can you provide such testimony? Yes or No.

3. An environmental professionals could be called in to defend his or her work in pending litigation on any project at any time.

True or False.

Answer Key

1. True, as long as Confidentiality has been maintained.

1. No. A geologist qualified in chemistry or project management can testify to costs incurred but cannot testify to the validity of costs associated with proposed environmental remedies, since that practice is restricted to licensed engineering design professionals.

1. True. A scientist or engineer could be called in to testify to his or her work on any project at any time, even if they are not considered an Expert.