

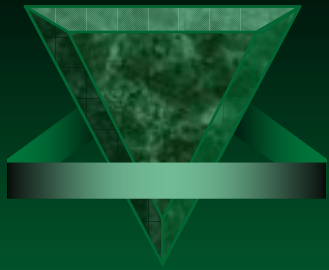


Toxicology

Convocation of Southern State Epidemiologists

04 Dec 2007

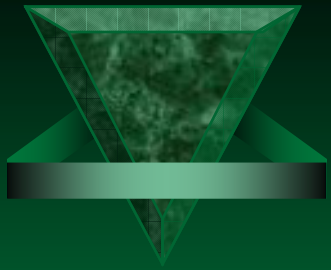
Cheryl Browder



Allegations

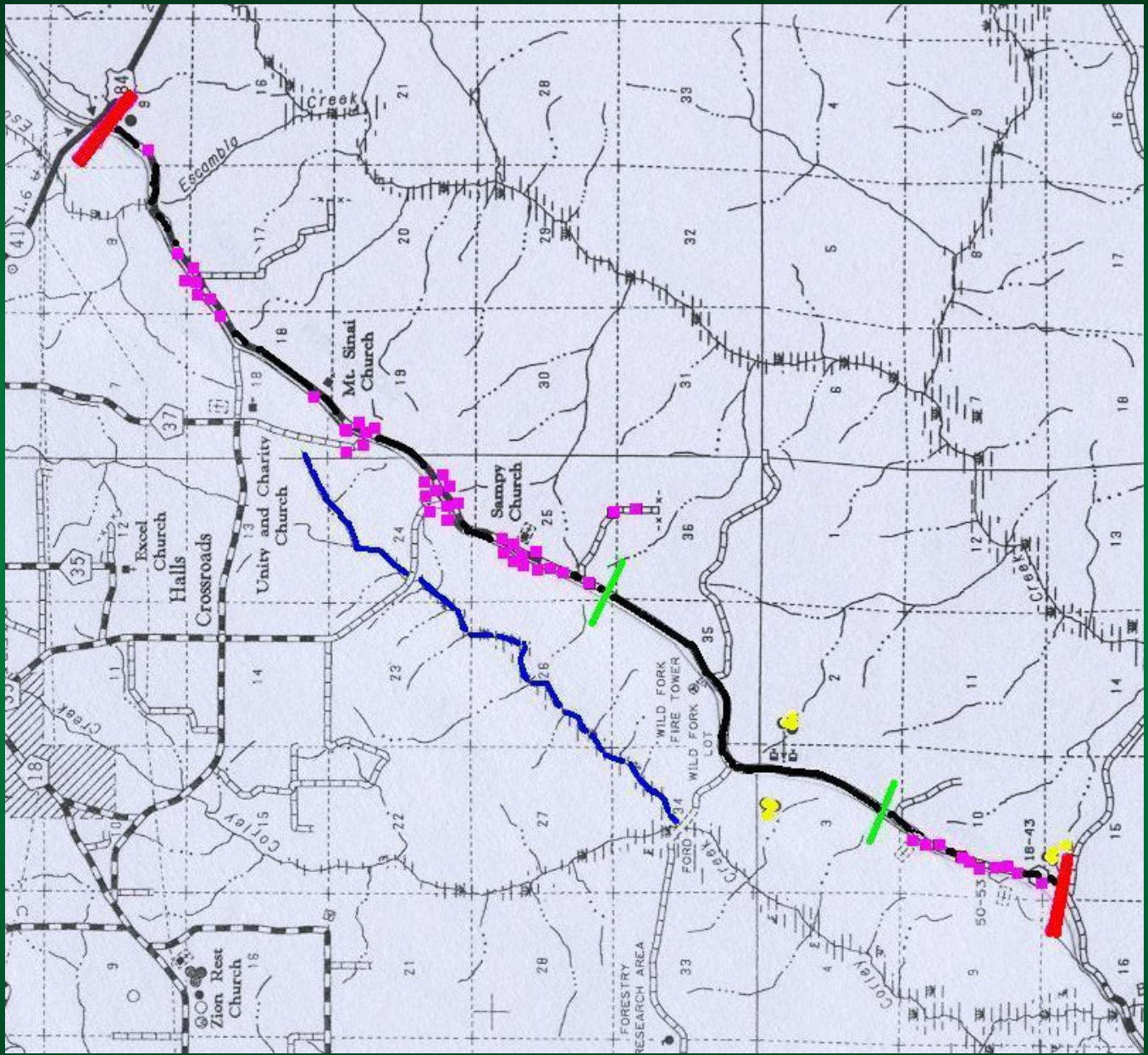
✓ Health: Diagnoses and/or Symptoms

- Facial numbness
- Involuntary movements
- Sleeplessness
- Fatigue
- Headaches
- Neurocognitive & immune system dysfunctions
- People positive for petroleum hydrocarbons
- Large lesions
- Liver failure
- Stomachaches
- Miscarriages
- Children with nosebleeds
- Children vomit after bathing



Allegations continued

- ✓ Cause: Environmental or Chemical Exposure
 - Oil & gas industry
 - Petroleum hydrocarbons
 - Hydrogen sulfide
 - “Foamy” water in spring-fed stream

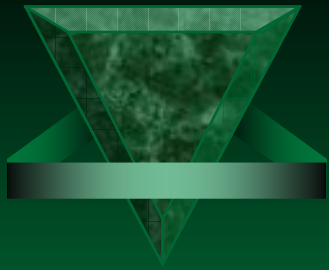


All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy.

Paracelsus

Exposure: media
intake
dose





Oil & Gas Industry

✓ Industry activities in southern portion, not northern

✓ Residential wells:

Residuum

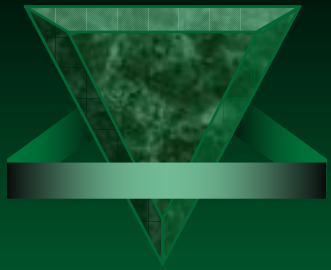
Pliocene-Miocene Aquifer

Lisbon Aquifer

Oil & Gas wells:

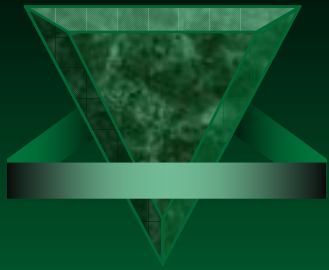
Lisbon Aquifer

✓ AL Oil & Gas Board sampled residential wells



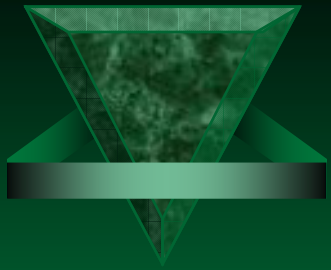
Petroleum Hydrocarbons

- ✔ Contaminants produced by Oil & Gas production are primarily naturally occurring and returned to deep aquifers via injection wells
- ✔ Petroleum hydrocarbons are released at automotive service stations and exhaust
- ✔ Air dispersion over 10-mile distance



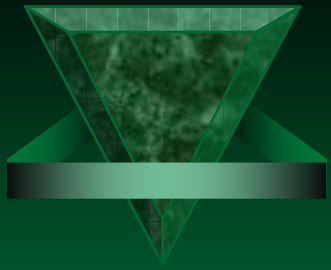
Residential Wells

- ✓ AL Department of Environmental Management sampled 10 residential wells
 - Consistently found: calcium, magnesium, sodium, chloride, fluoride,
 - Occasionally found: sulfate, iron, nitrogen, and Radium 228
 - All substances were below Maximum Contaminant Level for drinking water



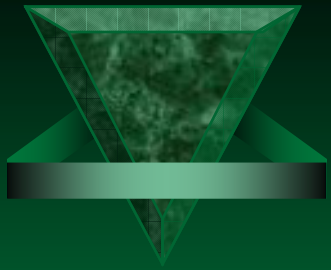
Hydrogen Sulfide

- ✔ Produced via natural processes in the human body
- ✔ Released by pulp & paper mills, natural gas production, swine containment & manure handling, geothermal power plants
- ✔ Air dispersion over 10-mile distance



Hydrogen Sulfide

- ▼ Chronic exposure: transient nasal irritation, sore throat, cough, dyspnea, incoordination, poor memory, hallucinations, anosmia (loss of sense of smell)
- ▼ Acute exposure: respiratory distress or arrest, pulmonary edema, cardiac arrhythmia or tachycardia, “knockdown,”



Hydrogen Sulfide

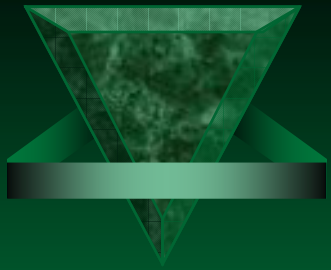
- ▼ EARTHWORKS conducted air sampling:*

Highest level of H₂S was in residential area, 2600 ppb

Oil and Gas facilities ranged 0 – 1200 ppb

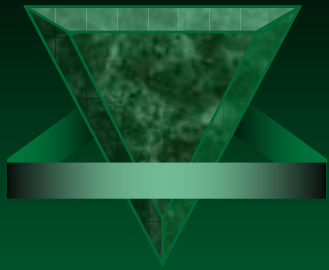
Wood product operation ranged 1 – 1400 ppb

* Caveat: report contained inconsistencies re. upper detection limits & reported measurements



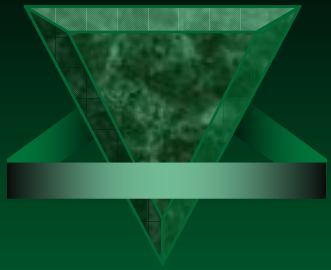
Spring-Fed Stream

- ✓ Stream adjacent to northern portion
- ✓ AL Department of Environmental Management sampled stream, found:
Iron (Secondary Drinking Water Standard)
- ✓ Iron bacteria can cause “foaming”



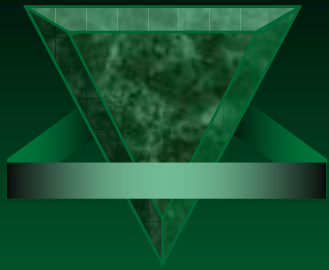
Epidemiology Survey

- ✓ 47 households, 128 individuals
- ✓ 320 questions re.
identity, demographics, residency,
employment, diet, symptoms, Dx, Rx,
insurance, lifestyle
- ✓ 32 symptom classes compared



Demographic Data

- ✓ Age: bimodal w/ peaks at 6-19 and 35-44
- ✓ Sex: 62 females, 61 males
- ✓ Race: 45% black, 49% white
1:1 almost every age group
- ✓ Residency: average 14 yrs. (range 2-44 yrs.)



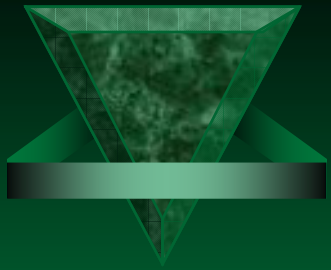
Drinking Water

68% Drink Well Water

- ✓ Age, sex, race similar to
→
- ✓ 63% reported no health limitations
- ✓ No health limitation cluster

32% Not Drink Well Water

- ← Age, sex, race similar to
- ✓ 66% reported no health limitations
- ✓ No health limitation cluster



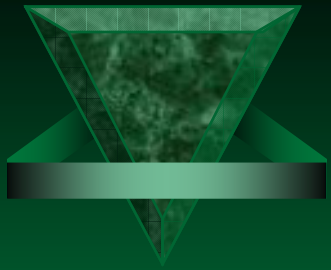
Drinking Water

68% Drink Well Water

- ▼ Greater % reported 9 symptom classes:
psychiatric/depress/anxiety, hypertension, child vomit, cancer, stomach problems, kidney problems, muscle problems, allergy/asthma, female problems

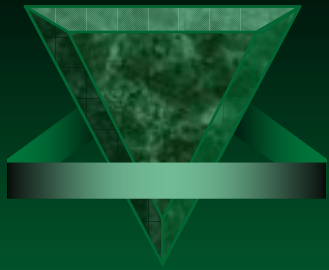
32% Not Drink Well Water

- ▼ Greater % reported remaining 23 symptom classes



Conclusions

- ✔ Community does not demonstrate clusters of particular diagnoses and/or symptoms
- ✔ Diagnoses and/or symptoms do not mirror potential health effects of hydrogen sulfide or petroleum hydrocarbons
- ✔ Residential well water is not contaminated with Oil and Gas Industry products/wastes



Acknowledgements

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