Society of Petroleum Evaluation Engineers Ethics Course

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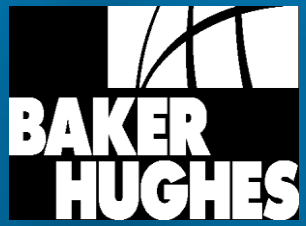
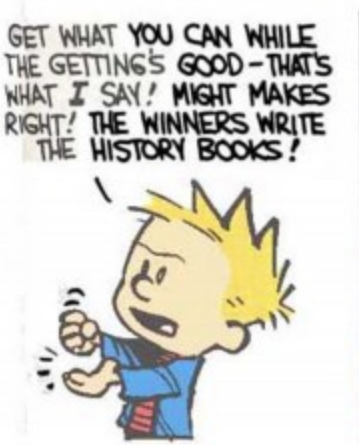
Halifax, Nova Scotia

D. Nathan Meehan, PhD, PE



Calvin and Hobbes

by Watterson



Overview

- A brief overview of stuff we always cover
- Some “hands on” cases

What is a profession?

- A career or occupation based on :
  - specialized education and training,
  - provide disinterested counsel or service for a defined compensation independent of other business gain.
  - Examples ---accounting, surveying, medicine, dentistry, actuarial science, law, architecture and engineering.
- Full-time,
- A specialized course of study,
- Governed by local and national associations,
- Codes of professional conduct, and
- State or other governmental licensing regulations.

Profession characteristics: a very limited monopoly

- The existence of state regulatory bodies governing the practice of a profession (and deciding who can be admitted into a profession) limits access to that profession.
- This bestows a limited monopoly on the practice of that profession.
  - Doctors
  - Architects
  - Structural engineers
  - Our profession

Licensing and registration

- Can you imagine a situation in which a company would employ medical doctors or attorneys who were not educated and licensed to governing standards?
- But in the case of petroleum engineering it is the norm! Most states do not require the licensing of engineers who are employees of a company that does not offer to perform engineering services to the public.
- Some people refer to licensed professional engineers as “registered” engineers; the term licensed more correctly conveys the concept.

Ethical guidelines (SPE)

The Fundamental Principle

- *The engineer as a professional is dedicated to improving competence, service, fairness, and the exercise of well-founded judgment in the ethical practice of engineering for all who use engineering services with fundamental concern for protecting the environment and safeguarding the health, safety and well-being of the public in the pursuit of this practice.*

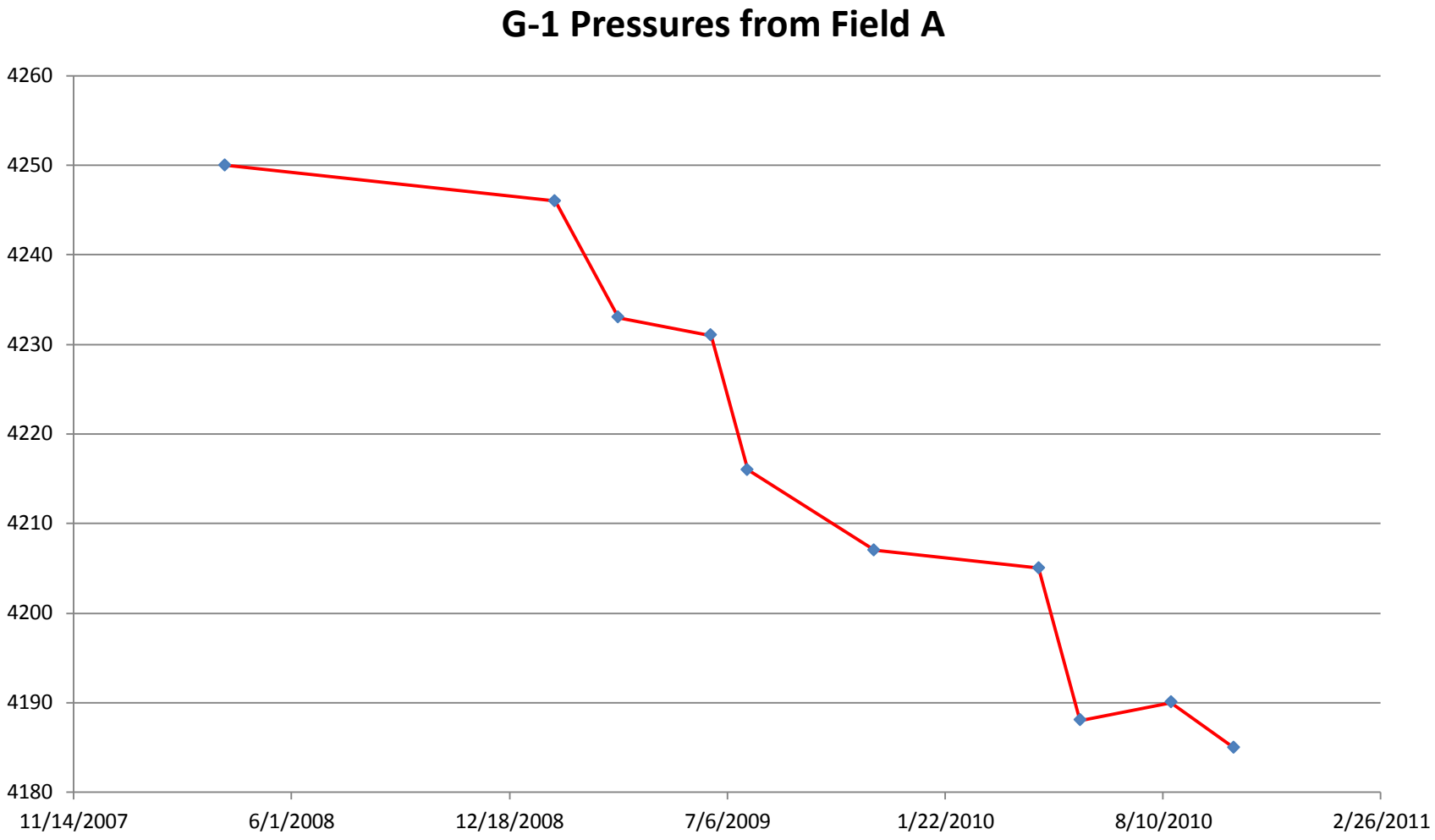
Canons (shortened)

- *Engineers offer services **in the areas of their competence** and experience, affording **full disclosure** of their qualifications.*
- *Engineers **consider the consequences of their work** and societal issues …and seek to extend public understanding …*
- *Engineers are **honest, truthful, ethical, and fair** in **presenting information and in making public statements**, which reflect on professional matters and their professional role.*
- *Engineers engage in professional relationships without bias …*
- *Engineers act in professional matters for each employer or client as **faithful agents** … **disclosing nothing** of a proprietary or confidential nature concerning the business affairs or technical processes …*
- *Engineers **disclose** to affected parties any known or **potential conflicts** of interest …might …appear to influence judgment or impair …fairness….*

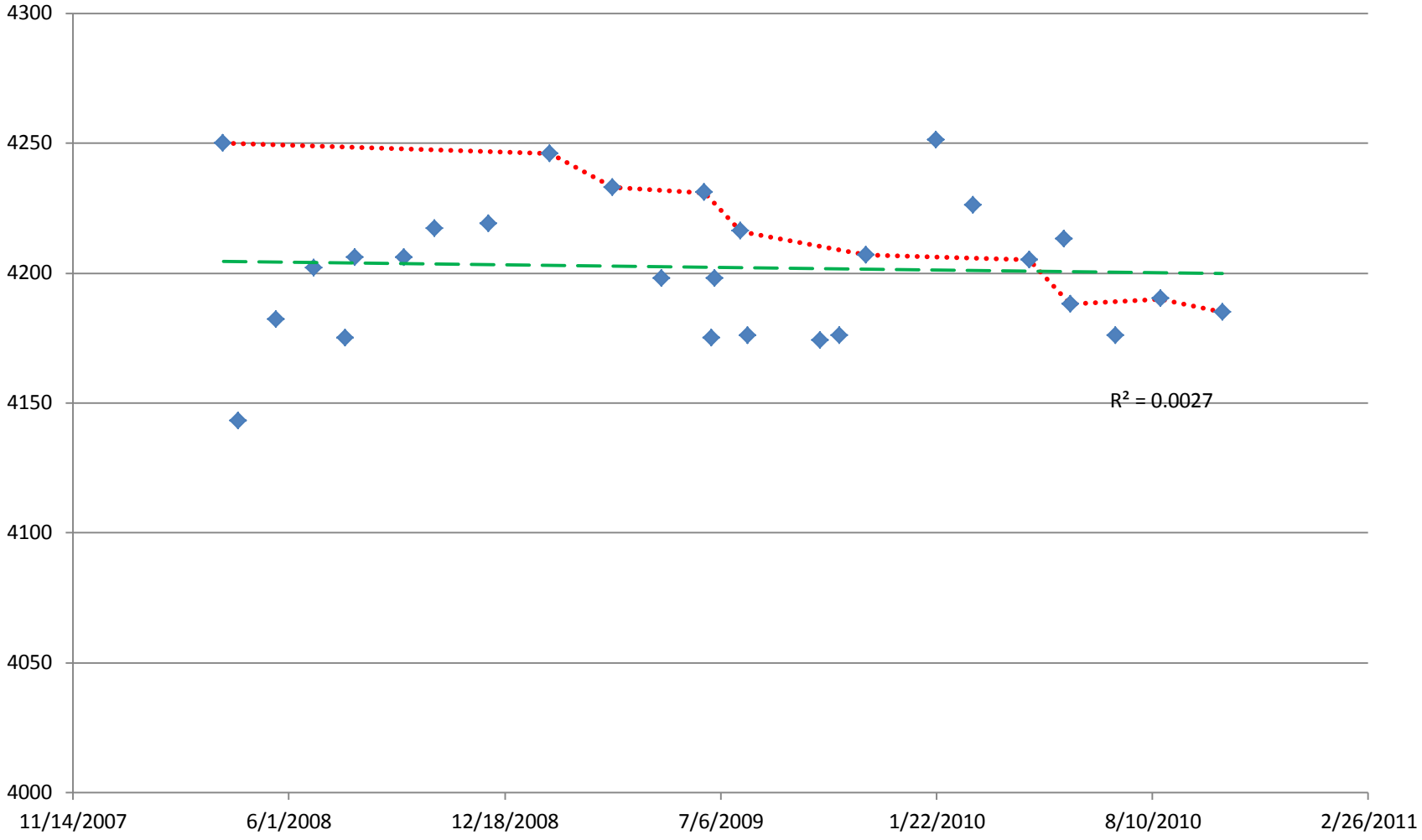
Canons (shortened)

- *Engineers are responsible for enhancing their professional competence…*
- *Engineers **accept responsibility for their actions**…properly credit the contributions of others; and do not accept credit for work not their own.*
- *Engineers, perceiving a consequence of their professional duties to adversely affect the present or future public health and safety, shall formally advise their employers or clients, and**, if warranted, consider further disclosure**.*
- *Engineers seek to **adopt technical and economical measures** to **minimize environmental impact.***
- *Engineers participate with other professionals in multi-discipline teams to create synergy and to add value to their work product.*
- *Engineers act in **accordance with all applicable laws** and the canons of ethics …as stated in the laws and regulations governing the practice of engineering … and lend support to others who strive to do likewise.*

Another ethical challenge



My graph


4300
4250
4200
4150
4100
4050
4000
11/14/2007
6/1/2008
12/18/2008
7/6/2009
1/22/2010
8/10/2010
2/26/2011
R² = 0.0027

Technology Investment Opportunity

- An inventor has developed a new technology that promises to radically improve people's lives. Should dramatically improve transportation, lower food and clothing prices and generate enormous revenues and profits for ay least the next one hundred years.
- Virtually everyone in the world is going to want this product.
- Careful analysis confirms that in fact the revenue potential is enormous and the invention will spawn hundreds of billions of dollars in peripheral technologies and infrastructure.
- Interested in investing?

Technology Investment Opportunity

- A few drawbacks.
- It will almost certainly generate a gigantic amount of air pollution.
- As it is adapted widely it will kill about 250,000 people a year worldwide.
- Still interested in investing?
- Think we should ban the invention?

Citigroup Center design flaw

- Bill LeMesurrier (AB Harvard, MSc, MIT) designed Boston City Hall, the Federal Reserve Bank of Boston, the Dallas Main Center and Singapore Treasury Center.
- He designed what was then the world's seventh tallest building completed in 1977.
- After it was fully occupied, a question from a student showed a major design and construction flaw that would almost certainly lead to the building's collapse.
- LeMessurrier went to the architect and then to Citigroup. They kept the flaw quiet and at night welded reinforcements to correct the gaffe.
- The group misled the public and it took 20 years for the information to come out.

Example Case 1-1

- A reservoir consulting group (RCG) owns and closely collaborates with their software subsidiary and has branched out from analyzing well performance to developing automated well monitoring and optimization software.
- They have a project to develop a prototype of the next generation of such software for one of the largest operating companies and their best customer, Z-Oil.
- RCG has been hurting financially due to massive operator cutbacks and this represents the one really big chance they have to get back in the game so they bid VERY aggressively for the prototype contract. With very hungry competitors, there really wasn't enough money in the project to do it right.
- They can't report a loss and maintain the loans they have --- a loss would sink the company.
- Because of their somewhat shaky financial position, the company was not willing to take a loss on the project, so the project has been underfunded and understaffed.
- Nevertheless those working on the project have made a heroic effort, working eighteen hour days seven days a week to meet the deadline, because they know how much it means to the company, not to mention their own jobs. They are now very close to success.

Inspired by Occidental Engineering Case Study By Michael McFarland, S.J.

Example Case 1-2

- A version of the prototype has been turned over at the last minute for testing to Wayne.
- He has run extensive simulations on it and found that it works as it should except for one little problem.
- Under certain circumstances the automated controls tied to profitability optimization push much of the equipment past the acceptable operating conditions leading to potential early failures and premature workovers.
- Wayne has been working with the software designers to identify the cause of the problem, and they have traced it to a subtle error in memory allocation and reuse. They are confident that they can fix it, but it will take a month or more to do the redesign, coding and testing.
- Wayne meets with his boss, Gus, the project manager, to discuss the implications.

Example Case 1-3

- Gus tells him that what he is asking for is impossible. The contract requires that the company deliver a fully certified, working version of the software in three days for system integration and test.
- Z-Oil has developed a new, get-tough policy on missed deadlines and cost overruns, and RCG is afraid that if they miss this deadline, Z-Oil will make an example of them.
- They would be subject to fines and the loss of the remainder of the prototype contract; and they might not be allowed to bid on the contract for the full system.
- This would have a devastating effect on RCG, resulting in many lost jobs and the potential to bankrupt the company.
- They consider whether they can do a quick patch to the software before turning it over, but Wayne adamantly refuses to release any code that has not been tested thoroughly. There is always a chance that the patch would interact with some other part of the program to create a new bug.
- "Then we'll have to deliver the software as is," Gus says. "I can't jeopardize this project or the jobs of my people by missing that deadline."

Example Case 1-4

- "We can't do that!" exclaims Wayne. "That's like delivering a car with defective brakes."
- "Don't worry," Gus reassures him. "We have contacts in Z-Oil, so we know their testing plans. We might even be hired to DO the testing. They will do a lot of simulations to make sure the software works with the hardware and has all the functionality in the specs. Then they will do live tests, but only at a small oilfield onshore. There is no way they will overload the system in any of this.
- After that they will have some change requests. Even if they don't, we can give them an updated version of the program. We can slip the bug fix in there. They will never see the problem. Even if they do, we can claim it was a random occurrence that would not necessarily show up in our tests. The important thing is no one is in any danger."
- "Maybe they won't find the bug, but I know it's there. I would be lying if I said the system passed all the necessary tests. I can't do that. Anyway, it would be illegal and unprofessional."
- "You can certify that it is safe, because it is, the way they are going to use it."

Example Case 1-5

- And so he does. In the end Wayne signs off on the software. It is delivered to the Z-Oil and makes it through all the preliminary tests, including live tests at a small oilfield. As a result of these tests, Z-Oil requests some changes in the user interface, and when RCG delivers the new software it includes a robust solution to the problem of the overloaded equipment. No one outside of Gus's group ever learns of the problem.
- In fact RCG's success with the prototype leads to major contracts for additional control software, giving them much-needed business and a big raise for Gus. This saves hundreds of jobs, and allows the company to add hundreds more.
- Calculated risk?
- Ethical breach?
- What would you do to save your company?

Tokenism and Promotions

- On the face of it, Darnell, Inc. has a strong commitment to affirmative action. Five years ago less than 1% of its professional and managerial staff were women. Now 8% are women. However, few of the women are in senior positions. Partly this is because most of the women have less seniority than the vast majority of men. But it is also because, until recently, there has been widespread skepticism at Darnell that women are well suited for the responsibilities that attach to the more senior positions. This may now be changing. Catherine Morris is one of the leading candidates for promotion to Chief Engineer in Quality Control at Darnell.
- Although they work in different areas of Darnell, Judy Hanson and Catherine Morris have gotten to know one another rather well in the few months Judy has been with Darnell. Judy likes Catherine very much, but she has serious doubts that Catherine is the right person for the promotion. She does not think that Catherine has strong leadership qualities or the kinds of organizational skills that will be needed. Furthermore, she is worried that if Catherine fails at the job, this will only reinforce the prevailing skepticism at Darnell about women's ability to handle senior position responsibilities. Rather than being a mark of women's progress at Darnell, it will be, Judy fears, a setback--one which will take its toll on other women at Darnell.

Source: Center For the Study of Ethics in Society, Western Michigan University

Tokenism and Promotions

- What, if anything, should Judy do?
- Suppose Judy overhears several male engineers talking about Catherine's possible promotion. They remark that she will never be able to handle the job--and that this will show once and for all how foolish, and potentially harmful, affirmative action in the workplace is. What should she do?
- Suppose, it is Tom Evans, not Judy, who overhears the conversation? What should he do?
- Suppose Tom and Judy overhear the conversation together.

Only job around

- Brock is a senior petroleum engineering student at Texas A&M and has worked his way through school at his father's well servicing company in Midland.
- Brock's Dad had strongly encouraged him to get an engineering degree but Brock really loved the business which was doing well while he was in school. His Dad agreed that if he wanted, he could come back and help run the business. As a result, Brock wasn't overly concerned about his GPA and didn't interview for jobs.
- The decline in oil prices corresponded with Brock's father becoming gravely ill. The business began losing cash and most employees were laid off. Even by selling off the business there would not be enough money for medical bills and other commitments.
- Brock and his family all agreed that the best course of action was to get a full-time job as a petroleum engineer.

Very loosely inspired by : "What Job You Can Accept" Online Ethics Center for Engineering

Only job around

- No one was still interviewing by the time Brock got the job.
- One of his father's previous customers ran an oil company with a poor reputation for paying its bills and a marginal safety and environmental track record (Cornershoot Oil & Gas Company, COGCO).
- COGCO was interested in Brock as they would have to dramatically lower workover costs by doing the work "themselves" and Brock could (in theory) do that and handle most of the engineering responsibilities in the company.
- COGCO knew the family but Brock seems very uneasy with the roles they are describing for him and their expectations.
- On the other hand, it appears to be the last job available and the only one for a Midland boy with a 2.2 GPA.
- When (if?) the industry turns around this experience might be really useful in getting a better job. Or would it just ruin his reputation too?

Bid on this job….

- Actual case. European oil company asked my consultancy to bid on a project that was (barely) in my wheelhouse. I had previously taught classes on compositional simulation but this would require me to bring in a lot of geochemical, geological and geomechanical expertise I didn't have.
- I really liked this operator and expected to do a lot more work with them. Their offices are in a beautiful city and they paid well. Work wasn't overly backed up.
- I expressed my reluctance but the (new contacts) *really* encouraged me to bid on it and I had recently developed a potential relationship with a Canadian group that could supply the needed expertise that would meet all expectations.
- I worked with the Canadians at considerable time and expense and delivered my proposal the day before the deadline.
- Three days after the deadline the Canadians called and withdrew. They were being bought by a company that would commit their full efforts to a Canadian project they wanted to do.

Bid on this job….

- I planned to call the operator to withdraw my bid and explain the problem.
- They called me first. “Are you sure you have taken all the costs into account? We are thinking your bid might be too low.” I had never had a conversation start like that.
- When I explained my problem, they refused to have me withdraw. No, just revise the bid under the working assumption that in the next few months you can find some other qualified subcontractors. You should probably assume that they will be quite a bit more expensive and that maybe this project will take longer to do…you know, given the uncertainties you face.
- Now I understood.

Bid on this job….

- I was apparently the “third bid” they needed in order to get the proposal through purchasing.
- Initially I was quite frustrated by this. I had been assured at the end of a prior project that they wanted me to not only come teach additional courses but to do some big projects.
- What would you do?
- Conversation with the SVP (and former student of mine).
- Is this actually an ethical issue (for them)?
- Is this actually an ethical issue assuming you knew your bid wasn’t real?
- The next project they asked me to bid on (sanctioned country).

Long ago oil spill

- Peter (consultant) has been working with the Bigness Oil Company's local affiliate for several years, and he has established a strong, trusting relationship with Jesse, manager of the local facility.
- The facility, on Peter's recommendations, has followed all of the environmental regulations to the letter, and it has a solid reputation with the state regulatory agency. The local facility receives various petrochemical products via pipelines and tank trucks, and it blends them for resale to the private sector.
- Jesse has been so pleased with Peter's work that he has recommended that Peter be retained as the corporate consulting engineer. This would be a significant advancement for Peter and his consulting firm, cementing Peter's steady and impressive rise in the firm. There is talk of a vice presidency in a few years.
- One day, over coffee, Jesse starts telling Peter a story about a loss in one of the raw petrochemicals he receives by pipeline. Sometime during the 1950s, a loss of one of the process chemicals was discovered when the books were audited. There were 10,000 gallons missing. After running pressure tests on the pipelines, the plant manager found that one of the pipes had corroded and had been leaking the chemical into the ground. After stopping the leak, the company sank observation and sampling wells and found that the product was sitting in a vertical plume, slowly diffusing into a deep aquifer. Because there was no surface or groundwater pollution off plant property, the plant manager decided to do nothing. Jesse thought that somewhere under the plant there still sits this plume, although the last tests from the sampling wells showed that the concentration of the chemical in the groundwater within 400 feet of the surface was essentially zero. The wells were capped, and the story never appeared in the press.

Dr. Mashhad Al-Allaf Associate Professor of Philosophy Petroleum Institute, Abu Dhabi

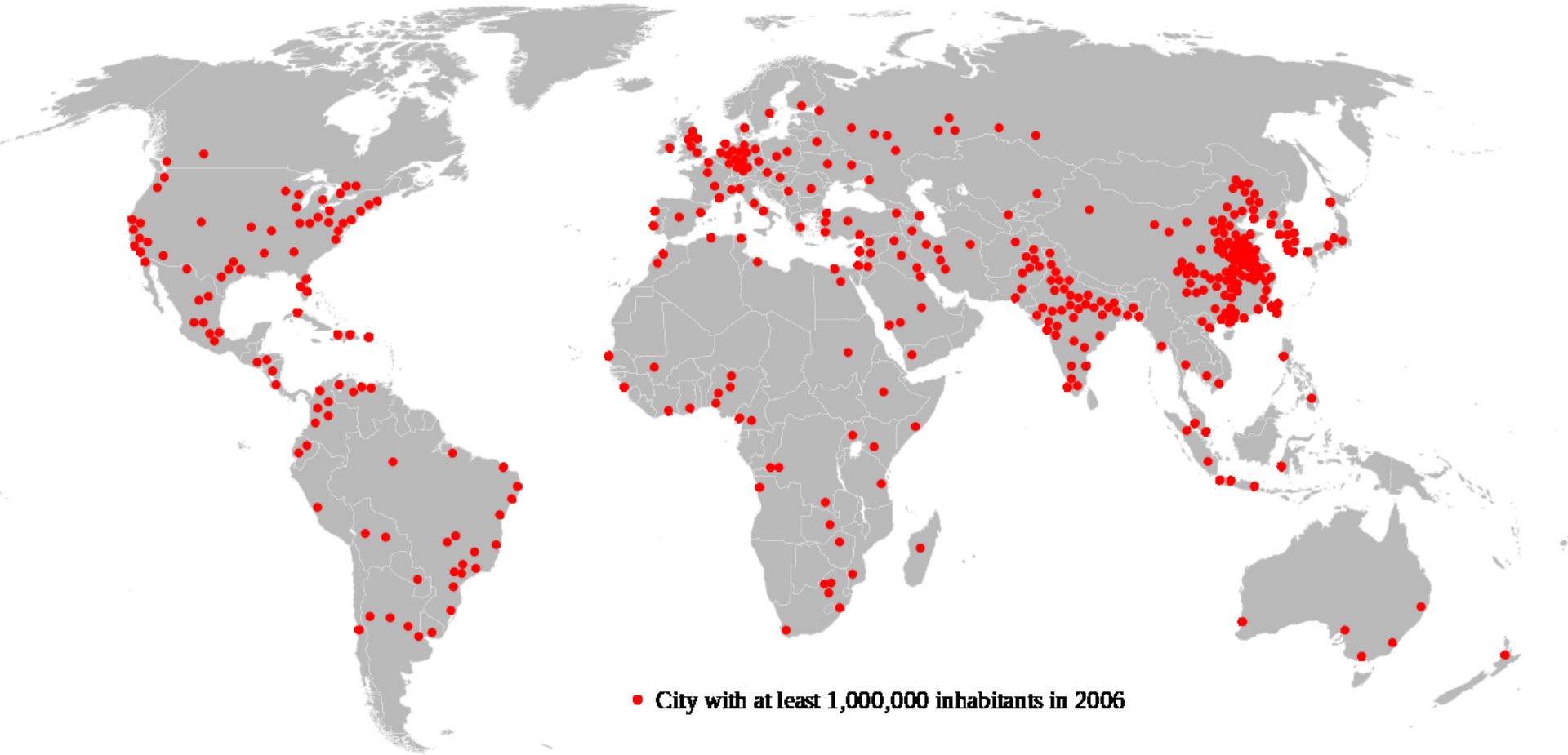
Long ago oil spill

- Peter is taken aback by this apparently innocent revelation. He recognizes that state law requires him to report all spills, but what about spills that occurred years ago, where the effects of the spill seem to have dissipated? He frowns and says to Jesse, "We have to report this spill to the state, you know."
- Jesse is incredulous. "But there is no spill. If the state made us look for it, we probably could not find it; and even if we did, it makes no sense whatever to pump it out or contain it in any way."
- "But the law says that we have to report...," replies Peter.
- "Hey, look. I told you this in confidence. Your own engineering code of ethics requires client confidentiality. And what would be the good of going to the state? There is nothing to be done. The only thing that would happen is that the company would get into trouble and have to spend useless dollars to correct a situation that cannot be corrected and does not need remediation."
- "But...."
- "Peter, let me be frank. If you go to the state with this, you will not be doing anyone any good--not the company, not the environment, and certainly not your own career. I cannot have a consulting engineer who does not value client loyalty."
- What are the ethical issues in this case? What factual and conceptual questions need to be addressed? How do you think Peter should deal with this situation?

Importance of Energy

- World population 35,000 BCE 3M hunter-gatherers
- 12,000 BCE 15 million. Agriculture develops.
- Plagues, famine. Agrarian economies. Energy from wood and crops.
- Coal use fueled industrial revolution and world population reached 1B by 1800 (3). 2B by 1923 and 7+B today (>50).

Importance of Energy



Availability of safe, clean affordable energy

- Quality of life indicators
  - safe water access
  - life expectancy at birth
  - infant mortality rate
  - mean years of schooling
  - electrification level
  - levels of communicable disease
  - GNP per capita

Picture credit: WHO/Ajay Pillarisett
http://www.who.int/features/2014/clean-household-energy/en/

Largest single source of avoidable deaths

- Air pollution
- Primarily Household Air Pollution (HAP)
- Tied to burning of wood, animal dung and crop waste
- Half of deaths for children under 5 due to HAP
- More than 3B cook using such fuels.
- Lack of education, dangers in gathering, effects on women and children

Photo Credit: WHO/ Heather Adair-Rohani
http://www.who.int/features/2014/clean-household-energy/en/


OUR PURPOSE
Enabling safe, affordable energy,
improving people's lives