ETHICS:
EXAMINING YOUR ENGINEERING RESPONSIBILITY

North Jersey Section AIChE

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WHO AM I?

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- MBA, Technology Management - University of Phoenix
- Work experience includes:
  - Diamond Shamrock – specialty chemicals
  - Occidental Chemical – specialty chemicals
  - Henkel Chemical – specialty chemicals
  - Olin Hunt – microelectronics chemicals
  - EI Associates – A/E consulting
  - BOC Gases – industrial gases
  - Schering-Plough - pharmaceuticals
  - ALZO International, Inc. – specialty chemicals

ATTRIBUTION

Information presented on these slides was obtained (with permission) from:

- **Ethics – Examining Your Engineering Responsibility** – Deborah L. Grubbe, P.E., CEng., FAIChE, FIChemE – CEP Magazine, February 2015

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Key Messages

- Yes, it is more than ethics.
- It's not what you do, it is what you do NOT do!
- It's not just "Do things right", it's "Do the right things"
- We can NEVER forget and NEVER stop:
  - With one mistake an engineer can kill more people than any other professional.

What we'll talk about

- Ethics
- Ethical situations
- Warning Signs
- Case studies
- Your Options
- Assess and Think
- Prepare for action
- Summary

Ethics

- **Easier to identify unethical behavior than it is to define it**
- **What is an ethical person?**
  - ***A person who has a set of values and lives by them***
  - ***A person who lives by any set of values which are shared, lived and determined by a group of people***
  - ***A person with a set of values that are universally accepted***

Ethics (continued)

- The word "ethics" originates from the Greek *ethos* which means habit, custom, or character
- Oxford Dictionary: *moral principles that govern a group's behavior*
- Harris *(et al)*: *an amalgam of complex concepts: professionalism, standards, risk management, liability, competence, truth, societal protection, trust, reliability, honesty, cost/benefit, attitude, obligation, organization, whistleblowing, regulation,* and the *law*
- 3 primary types of ethics: *Business, Engineering, Personal*

Ethical Situations (a few)

- Your boss asks you to take action…
- Inappropriate use of power
- Being undermined by a colleague's lies
- Not openly discussing issues
- Fabricated research results
- Cheating on exams

Warning Signs

- Being subtly or openly threatened
- Feeling afraid for your job due to …..
- Having that “nagging feeling” or “little voice”
- Being asked to do everything verbally, and to put nothing in writing
- Normal openness disappears and things suddenly become “hush, hush”

What Are Your Options?

1) Take personal action quickly after you see a situation. Start by asking questions vs. making statements. You have max control.

2) Allow the situation to develop before doing anything. Could things get worse?

3) Do nothing and hope it will all "go away."

Case Studies

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Let's take a look at a few Case Studies…

Hyatt Regency Skywalk Collapse

Incident Facts

- July 17, 1981
- 7:05 p.m.
- 2 walkways over hotel atrium collapsed during a tea party
- Construction difficulties resulted in walkway suspension system design change
- 114 dead / 219 injured

Hyatt Regency Walkway Collapse

- **Investigation Found**
  - **Original design found to support only 60% of minimum load required by Kansas City building codes**
  - **Havens Steel – contractor manufacturing support rods – objected to Jack D. Gillum & Associates' original design due to anticipated damage to rods during construction**
  - **Alternate plan proposed by Havens later found to support only 30% of minimum load**
  - **Problem was lack of proper communication between Havens & Gillum:**
    - *Drawings prepared by Gillum & Associates were preliminary sketches, interpreted by Havens to be finalized drawings*
    - *Gillum & Assoc. accepted Haven's alternate design without performing basic calculations that would have identified the design flaw*

Space Shuttle: *Challenger*

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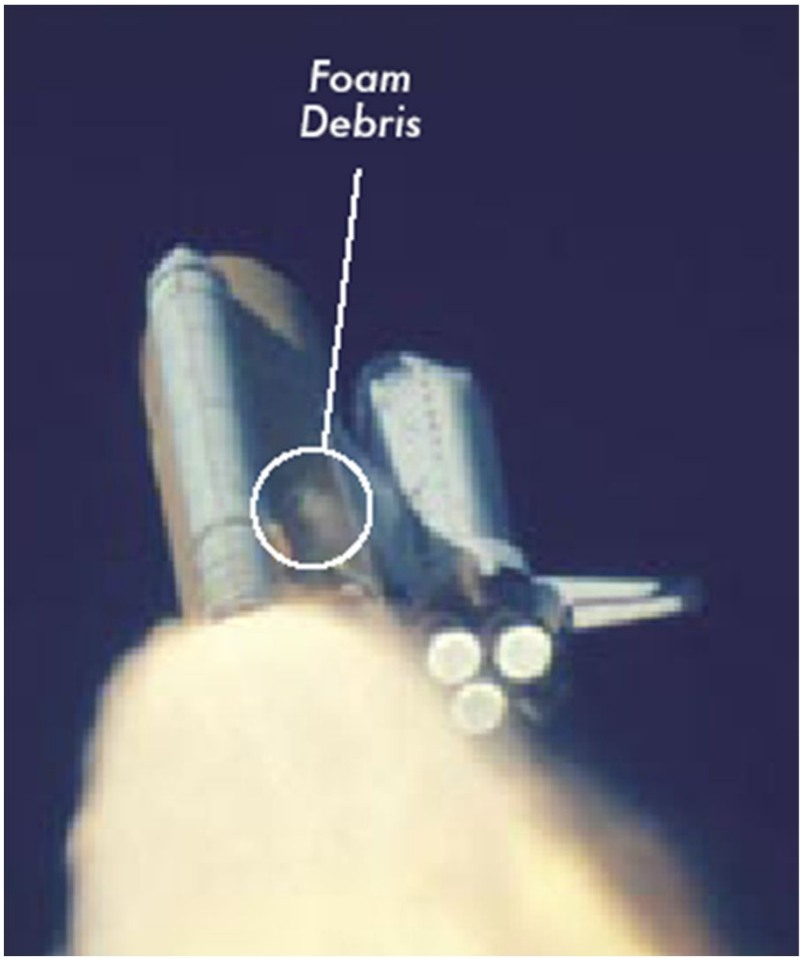
Incident Facts

- January 28, 1986
- T +73 seconds
- SRB O-ring joint fails
- SRB strut melts
- Explosion: 7 dead
- Rogers Commission
- “Prove to me it is safe”
- “Go Fever”

Space Shuttle: *Challenger*

- **Rogers Commission Found**
  - NASA had long known about recurrent damage to O-rings
  - Increasing levels of O-ring damage tolerated over time: Based upon rationale that *"nothing bad has happened yet"*
  - SRB experts had expressed concerns about the safety of the Challenger launch (deferring to technical experts)
  - NASA's culture prevented these concerns from reaching top decision-makers (communication patterns, culture)
  - Past successes had created an environment of over-confidence within NASA (complacency)
  - Extreme pressures to maintain launch schedules may have prompted flawed decision-making

Space Shuttle: *Columbia*



Incident Facts

- February 1, 2003
- Insulating Foam
- Dislodged T+81 Seconds
- Damaged Thermal Tiles
- Engineers asked 8 times for pictures
- Launch +16 days
- Shuttle Disintegrated Upon Re-Entry

Space Shuttle: *Columbia*

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- **CAIB Found**
  - **NASA had long known about foam damage dangers**
  - **Levels of foam damage tolerated over time: Based upon rationale that *"nothing bad has happened yet" and foam was viewed as a turnaround issue, not as a flight safety issue***
  - **Engineers had expressed concerns (8x) about the safety of the Columbia launch (deferring to technical experts)**
  - **NASA's culture prevented these concerns from reaching top decision-makers (communication patterns, culture, "B" team)**
  - **Past successes had created an environment of over-confidence within NASA (complacency)**
  - **Leadership issues: "Tone at the Top"**

Space Shuttle: *Columbia*

Safety Culture

"In our view, the NASA organizational culture had as much to do with this accident as the foam."

Columbia Accident Board Report, Volume 1, Page 97

BP Texas City Explosion

Incident Facts

- March 23, 2005; 15 dead, > 170 injured
- Column overflow on startup
- Trailer placement
- Shift handover
- Supervisor Accountability
- Communications
- Culture

BP Internal Investigation

- **Baker Panel**
  - Modeled after the Columbia Accident Investigation Board
  - The Baker-led panel, announced in October 2005, traveled to BP's five U.S. refineries, interviewed more than 700 employees and reviewed more than 340,000 pages of documents. The panel also surveyed about 7,500 employees and contract workers to assess their attitudes of BP's process safety culture.
  - The 300-plus page report said the company emphasized personal safety over what it called "process safety," or containing potential hazards such as explosions.
  - The panel ultimately made 10 recommendations, including that an independent monitor report to the company's board of directors for five years.

Deepwater Horizon

Incident Facts

- April, 2010
- Offshore Louisiana
- Hi Pressure Reservoir
- Under cost pressure
- Relative inexperience
- Culture
  - Communications
  - Ops knowledge

Deepwater Horizon Study Group

- **Investigation**
  - The accident report concluded that no single action caused the incident – it was a culmination of a complex interaction of mechanical failures, human judgments, engineering design, operational implementation and team communication
  - The DHSG (Deepwater Horizon Study Group) analysis indicated that this disaster was preventable if existing progressive guidelines and practices been followed—the Best Available and Safest Technology (BAST)
  - (DHSG) analysis of the available evidence indicated that when given the opportunity to save time and money—and make money—poor decision making played a key role in accident causation

Case Study Take-Aways

- **All case studies reviewed have, at their roots, inadequate non-technical communication and thought patterns**
- **Another common element – *unsteady-state operation***
  - ***Skywalk exposed to larger than expected dynamic loads due to partiers dancing on them***
  - ***Astronauts didn't die in space – they died going up or coming down***
  - ***Refinery explosion occurred during start-up***
  - ***Oil well explosion occurred as the well was being secured after drilling was completed***

Assess and Think

- Know your limits. Do you have bright lines?
- Assess your situation
  - Personally, financially, professionally
  - Options?
  - Is your thinking correct?
  - Who can you trust?
  - Are legalities involved?
  - Outside counsel? Get guidance.

OSHA Whistleblower Protection Program

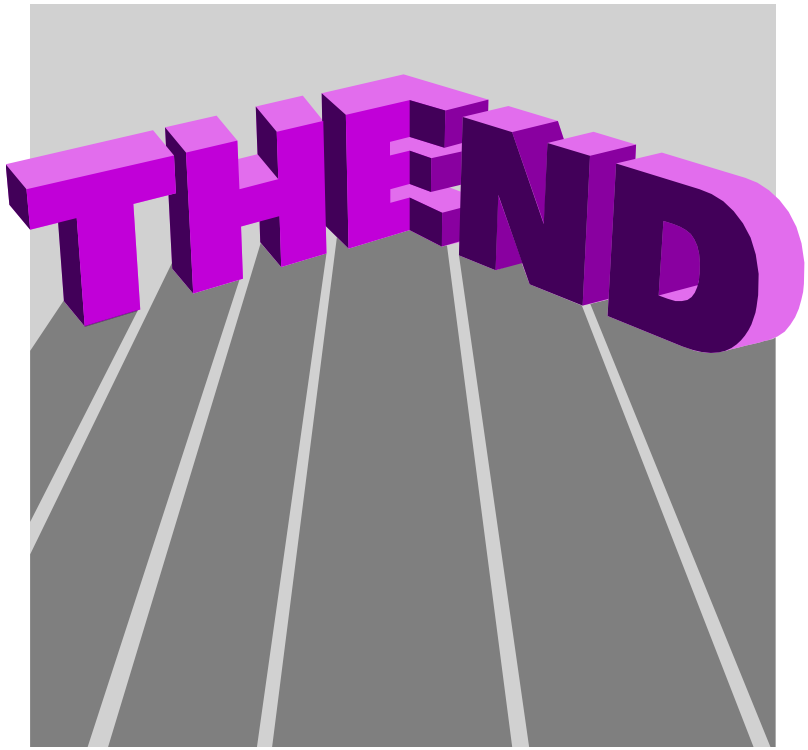
- Protects employees who report violations of various workplace safety, environmental, nuclear, pipeline, food safety, financial reform and securities laws (among others)
- Employers may not retaliate against workers who participate in safety and health activities, report a work-related injury, illness or fatality, or report another type of violation of the statutes
- Employees who feel they have been retaliated against, *(e.g.; demoted, suspended, denied a promotion, fired, threatened, etc.)* can file a complaint with OSHA

Prepare for Action

- Do your homework
- Know the consequences of your thoughts
- Your reputation will follow you.
- Decide on your course of action.
- Execute your plan in a methodical manner
- Consider “Known / Unknowns” & stay flexible

In conclusion…

- Ethics is an area to pay attention to
- Most careers have a few tough situations
- It gets tougher (and easier) as you get older (!!)
- Your reputation – it is the only thing you own besides your name…..take care of it.


THE END

"There is no expedient to which a man will not resort to avoid the real labor of thinking."

Sir Joshua Reynolds

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