

Incident at Morales
An Engineering Ethics Story

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Introduction

Incident at Morales, an Engineering Ethics Story was developed and produced during 2002 - 2003 by the National Institute for Engineering Ethics (NIEE), Murdough Center for Engineering Professionalism at Texas Tech University under a grant from the National Science Foundation (NSF SES-0138309) and major contributions from engineering societies, companies, universities, and individual donors.

Produced and directed by Emmy award-winning and Oscar-nominated Great Projects Film Company in New York City, *Incident at Morales* is a 36-minute dramatic case study cast in an international setting which emphasizes the ethical responsibilities of engineers and the resulting benefit to the public.

Background

Incident at Morales is the result of efforts of an 8-member team, serving as executive producers, plus several assistants and advisors, and a producer and writer. The executive producers consisted of engineers, engineering faculty, philosophy faculty, and practicing professionals from industry.

Executive Producers

1. Jimmy H. Smith, Ph.D., P.E., M.ASEE, Civil Engineering, Texas Tech University, Project Director
2. Steven P. Nichols, Ph.D. J.D., P.E., M.ASEE, Mechanical Engineering & Assoc. VP/Research, University of Texas at Austin
3. Michael C. Loui, Ph.D., M.ASEE, Electrical & Computer Engineering, University of Illinois at Urbana-Champaign
4. Vivian Weil, Ph.D., Director, Center for the Study of Ethics in the Professions, Illinois Institute of Technology
5. Philip E. Ulmer, P.E., Consulting Safety Professional, Eagle River, Alaska
6. Fredrick Suppe, Ph.D., Philosophy, Texas Tech University
7. Carl M. Skooglund, Retired Vice President & Ethics Director, Texas Instruments
8. E. Walter LeFevre, Jr., Ph.D., P.E., M.ASEE, Past President, NSPE, Civil Engineering, University of Arkansas

Special Assistants and Technical Advisors

1. Dave Dorchester, P.E., Immediate Past President, NIEE, Lead Role in Development of

Private Funding

2. Jose Guerra, P.E., Civil/Structural Engineering, Austin
3. Jose Novoa, P.E., Civil/Environmental Engineering, Dallas
4. Christopher Smith, Chemical Engineering, Dallas
5. Patricia Harper, NIEE Program Coordinator and Video Production Assistant

Producer: Kenneth Mandel, President, Great Projects Film Company, Inc., New York, NY

Writer & Director: Paul Martin, Great Projects Film Company, Inc., New York, NY

Purpose

Incident at Morales is a video designed for educational purposes which dramatizes a fictional but realistic case highlighting ethical issues in the professional practice of engineering. The video is intended to be used with students in engineering schools and/or with groups of engineers at in-house workshops and at professional meetings. It is not intended as a “quick fix,” but as one tool to augment programs in engineering ethics. Typical programs in engineering ethics have several goals. The video team started with goals similar to those typical programs in engineering ethics, namely:

- **Sensitivity:**to raise awareness of ethical aspects of professional work
- **Knowledge:**to learn about professional standards such as codes of ethics
- **Judgment:**to develop skills in moral reasoning
- **Commitment:**to strengthen personal dedication to exemplary conduct

Story, Synopsis, Ethical Issues, and Cast of Characters

Story:

Incident at Morales involves a variety of ethical issues faced by a company that wants to quickly build a plant in order to manufacture a new chemical product to gain a competitive edge over the competition.

Potential technical and ethical issues arise from design choices, including valves, piping, chemicals, etc. The process to produce the product is designed to be automated and controlled by computer software. The process also involves high temperatures and pressures and requires the use of chemicals that need special handling.

Because of environmental considerations related to the chemicals used in the process, the company decides to construct their plant in Mexico. Technical, environmental, financial, and safety problems arise that involve ethical issues.

Synopsis:

Phaust Chemical manufactures “Old Stripper,” a paint remover that currently dominates the market.

On learning that *Phaust’s* competitor, *Chemitoil*, plans to introduce a new paint remover that may capture the market, executives at *Phaust* decide to develop a competing product.

To save money in manufacturing the product, *Phaust* decides to construct a new chemical plant in Mexico and hires chemical engineer Fred Martinez, a former consulting design engineer for *Chemitoil*, to design the new *Phaust* plant.

Problems arise when *Chemistré*, *Phaust’s* parent company in France, slashes budgets 20% across the board.

In response, Chuck, the Vice President of Engineering at *Phaust*, strongly encourages Fred to reduce construction costs.

Fred confronts several engineering decisions in which ethical considerations play a major role:

- Whether to use expensive controls manufactured by Lutz and Lutz, which has an inside connection at *Phaust*
- Whether to line the evaporation ponds to prevent the seepage of hazardous substances in the effluents into the groundwater, although local regulations may not require this level of environmental protection
- Whether to purchase pipes and connectors made with stainless steel or a high pressure alloy

When samples of *Chemitoil’s* new paint remover “EasyStrip” become available, it is clear that to be competitive with “EasyStrip,” *Phaust* must change the formulation of its new paint remover, which requires higher temperatures and pressures than originally anticipated.

Some unexpected serious problems arise:

- Leakage occurs in one of the connections during the initial test phases
- The automatic control system fails - the plant manager volunteers to control the process manually
- After the plant goes into full operation, an accident occurs, and the plant manager is killed while manually controlling the manufacturing process.

Ethical Issues:

A wide variety of ethical issues surface in *Incident at Morales*, including:

1. Ethical responsibilities and obligations don't stop at the U.S. border. Wherever engineers practice, they should protect the health, safety, and welfare of the public.
2. The professional obligations of engineers go beyond fulfilling a contract with a client or customer.
3. How an engineer fulfills professional obligations may depend on the social and economic context of engineering practice.
4. Ethics is an integral (and explicit) component of ordinary technical and business decision-making in engineering practice.
5. Technically competent, ethically sensitive, reasonable people may have different perspectives and can disagree when faced with complex ethical issues.
6. Negotiations resolve some of the conflicts in the video, but some ethical conflicts remain unresolved. Sometimes the solution to ethical problems may involve compromises.
7. Market stresses arise from competition with other companies, and from pressures to advance a design and construction schedule.
8. It is sometimes necessary to make decisions under pressure with incomplete data, insufficient time, and insufficient information.
9. Codes of ethics and guidance from technical and professional societies, as well as those from engineering licensing boards are helpful in resolving ethical problems.
10. Consideration of consequences of technical, financial, and ethical decisions is an important element of the video

Cast of Characters

Fred:Engineer hired by *Phaust* to design a new plant to manufacture a new paint remover
 Wally:Fred's supervisor at *Phaust*
 Chuck:Vice President of Engineering at *Phaust*
 Dominique: Corporate liaison from *Chémistré* (parent company in France) to *Phaust*
 Maria:Fred's wife, a compliance litigator for U.S. Environmental Protection Agency
 Hal:Market Analyst at *Phaust*
 Jen:Research Chemist at *Phaust*
 Peter:Project Manager of the construction firm that builds the new plant in Morales
 Jake:Plant Manager for the *SuisseChem* plant in Big Spring, Texas
 Manuel:Plant manager for the new *Phaust* plant in Morales, Nuevo Leon, Mexico

Suggestions for Use of the Video

Incident at Morales is available in VHS and Interactive DVD formats. It is designed for use with a discussion facilitator. The total running time of the video is thirty-six minutes; there are opportunities to pause for discussions after approximately twelve and twenty-four minutes in the VHS format and these breaks are an option in the Interactive DVD format.

At each break, the facilitator may engage viewers in a discussion of the ethical issues raised in the previous segment. At a university, the video may be used in three consecutive fifty-minute class sessions; the professor or facilitator might use one segment in each class session.

In a professional development workshop or seminar, two hours would be sufficient time for viewing and discussion.

The facilitator should view the video in advance and plan the discussion periods. The facilitator may decide to break a large audience into smaller groups - each consisting of three to six participants - for a more effective discussion period.

The facilitator should assign specific tasks to the participants. For instance, participants may be asked to generate questions for further discussion; suggestions for discussion questions appear in the Study Guide that accompanies the video. Specific questions might require participants to:

- Identify ethical, technical, and economic issues and problems
- Identify affected parties (stakeholders) and their rights and responsibilities
- Identify social and political constraints on possible solutions
- Determine whether additional information is needed to make a good decision
- Suggest alternative courses of action for the principal characters
- Imagine possible consequences of those alternative actions
- Evaluate those alternatives according to basic ethical values

Actions can be evaluated by whether they honor basic ethical values such as:

- Honesty
- Fairness
- Civility
- Respect
- Kindness

Actions can also be evaluated by the following tests (cf. Davis, 1997):

- Harm test: Do the benefits outweigh the harms, short term and long term?
- Reversibility test: Would I think this choice was good if I traded places?

- Colleague test: What would professional colleagues say?
- Legality test: Would this choice violate a law or a policy of my employer?
- Publicity test: How would this choice look on the front page of a newspaper?
- Common practice test: What if everyone behaved in this way?
- Wise relative test: What would my wise old aunt or uncle do?

In a classroom with engineering students, the professor might assign a short in-class writing exercise or a longer reflective paper. In these assignments, students should articulate what they learned from the video and from subsequent discussions.

To encourage wide-spread use of this educational tool, the National Institute for Engineering Ethics has sent a free copy of *Incident at Morales* to all engineering deans for use in engineering ethics education and to all major engineering societies for use by practicing engineers. It has also been used in Central and South American countries as well as several countries in Europe.

It is the belief of the authors of this paper and the video team that *Incident at Morales* is a highly effective method of communicating ethics to students in engineering education and to engineers in industry.

Reference:

Davis, Michael (1997), "Developing and Using Cases to Teach Practical Ethics," *Teaching Philosophy*, vol. 20, no. 4, pp. 353–385.

Additional Resources for Teaching Engineering Ethics:

C. E. Harris, M. S. Pritchard, and M. J. Rabins, *Engineering Ethics: Concepts and Cases*, 2nd ed., Wadsworth/Thompson Learning, 2000.

D. G. Johnson, *Ethical Issues in Engineering*, Prentice-Hall, 1991.

M. W. Martin and R. Schinzinger, *Ethics in Engineering*, 3rd ed., McGraw-Hill, 1996.

Online Ethics Center for Engineering and Science: <http://onlineethics.org>.

National Institute for Engineering Ethics: <http://www.niee.org>.

Biographical Information

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STEVEN P. NICHOLS, Ph.D., J.D., P.E., Executive Producer and Leader of Script Development, Professor of Mechanical Engineering, Director of the Clint Murchison Chair for Free Enterprise, and Associate Vice President for Research, University of Texas at Austin, Austin, Texas.

Note: *Incident at Morales* is available in VHS tape format and in Interactive DVD format; the latter contains 45 minutes of discussion of ethical issues by the executive producers. The NIEE Website contains a short clip from the video as well as several resources related to the video which are downloadable free of charge. These free resources include a 24 page Study Guide, a Power Point presentation, the script and other materials. For this and additional information, see www.niee.org – click on Products & Services.