NO. 40010-3

COURT OF APPEALS, DIVISION II
OF THE STATE OF WASHINGTON

DENNIS RITTER,

Appellant,

v.

STATE OF WASHINGTON, BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS,

Respondent.

FILED
COURT OF APPEALS
DIVISION II
10 APR 15 PM 2:27
STATE OF WASHINGTON
BY
DEPUTY

RESPONDENT'S BRIEF

ROBERT M. MCKENNA
Attorney General

JODY LEE CAMPBELL
Assistant Attorney General
WSBA No. 32332
PO Box 40110
Olympia, WA 98504
(360) 664-2475

04-14-10 pm

ORIGINAL

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I. INTRODUCTION

The Board of Registration for Professional Engineers and Land Surveyors (Board) is a specialized Board created under RCW 18.43, for the purpose of regulating engineers, which are licensed for the purpose of safeguarding "life, health, and property, and to promote the public welfare." RCW 18.42.010, RCW 18.43.030.

In this case, the facts are undisputed: Mr. Ritter was convicted of three counts of first degree child molestation for molesting his daughter who was less than 12 years old at the time. The fact of the convictions is inconsistent with the engineering statute's requirements that registrants be of good character and reputation. Moreover, they are contrary to the conduct and standards generally expected of those practicing professional engineering. Consequently, the Board's order suspending Mr. Ritter's license for five years is proper, and this Court should affirm it.

II. COUNTERSTATEMENT OF THE ISSUE

Even though he phrases it three different ways, Mr. Ritter essentially raises only one issue: did the Board properly conclude that Mr. Ritter no longer met the statutory requirement that he be of good character and reputation when he pled guilty to three counts of first degree child molestation?

III. COUNTER STATEMENT OF THE CASE

Mr. Ritter was convicted of three counts of first degree child molestation. Administrative Record (AR) 57–171.[1] The victim was his daughter, who was less than 12 years old at the time. AR 157. The Board decided to initiate professional disciplinary proceedings against Mr. Ritter's license, alleging the convictions violated RCW 18.235.130(1), and it issued him a letter commencing a brief adjudicative proceeding. AR 83–89. Mr. Ritter applied to have the matter converted to a full formal administrative hearing, and the presiding officer granted the application. AR 82.

The evidence submitted at the hearing included certified copies of Mr. Ritter's indictment, guilty plea, and judgment and sentence. AR 57-81. Mr. Ritter's guilty plea contained the following statement:

> Between Jan 1 1998 and Jan 1, 1999 on 3 separate occasions, I had sexual contact w/ EMR for my own sexual gratification. EMR was less than 12 years old @ the time, not married to me and I was more than 36 months older than EMR.

AR 79. The documentation submitted in the brief adjudicative proceeding before it was converted to a formal hearing, was also submitted at the formal hearing. AR 82–164. Among those documents was an "Affidavit

[1] For convenience, the Respondent adopts the same reference abbreviations as the Appellant. "AR" refers to the administrative record.

of Relatedness" signed by George A. Twiss, Executive Director of the Board. AR 91–93. The affidavit contains statements to the effect that an engineer "must be of good character and reputation" that engineers are "looked upon by the public as respected and trusted service providers," and "the public's trust and confidence is significantly based upon the long established credibility of the profession and the expectation that [engineers] are of 'good character and reputation.'" AR 91–93. The Affidavit also stated "the Respondent holds a position of trust and respectability within the professional and civilian community in which he resides. His conduct, which was not a one-time offense, is in direct contradiction and violation of that trust." AR 164.

Mr. Ritter also submitted exhibits, consisting of letters from friends and relatives in his support. AR 126–137. Mr. Ritter was the only witness to testify at the hearing. AR 2. Mr. Ritter admitted, in his pre-hearing brief, that his actions were a violation of his daughter's trust:

> The Licensee agrees that there was a violation of a position of trust between himself and his victim in his criminal convictions.

AR 141. After hearing the arguments of the parties and reviewing the evidence, the Board of Registration for Professional Engineers and Land Surveyors ordered that Mr. Ritter's engineering license be suspended for five years, and reinstated only on application to the Board. AR 159–160.

The basis for the Board's order was the Board's finding that Mr. Ritter's conduct in committing child molestation is "inconsistent with the statutory requirements of good character and reputation." AR 158. The Board also found, "Respondent's crimes are contrary to the conduct and standards generally expected of those practicing professional engineering." AR 158.

IV. STANDARD OF REVIEW

Although Mr. Ritter argued below that his crimes did not relate to the practice of engineering, he failed to raise the issue of lack of evidence. AR 36–41, 138–142. Issues not raised before the agency may not be raised on appeal, except in limited circumstances specified in RCW 34.05.554, which do not apply here.

Mr. Ritter's appeal further asks the Court to consider a matter that is squarely within the discretion of the Board. When reviewing matters within agency discretion, "the court shall limit its function to assuring that the agency has exercised its discretion in accordance with law, and shall not itself undertake to exercise the discretion that the legislature has placed in the agency." RCW 34.05.574(1); *see Clausing v. State*, 90 Wn. App. 863, 870–71, 955 P.2d 394 (1998) *review denied* 136 Wn.2d 1020 (1998) (court affirmed findings drawn from evidence in the record that petitioner claimed the agency improperly considered, holding that

evidentiary decisions made in adjudicative proceeding lie within agency's discretion and were exercised in accordance with the APA and applicable agency rules, citing RCW 34.05.574(1)).

Mr. Ritter bears a high burden to show that the Board's order should be overturned in this case. Judicial review of a final agency order is pursuant to RCW 34.05.570(3), under which the court shall grant relief only if it determines that Petitioner "has been substantially prejudiced by the action complained of." RCW 34.05.570(1)(d). Relief shall be granted only if the court determines that the agency's order exceeds statutory authority, involves an error in interpreting or applying the law, is not supported by substantial evidence, or is arbitrary or capricious. *See* RCW 34.05.570(3).

The final agency order is deemed to be prima facie correct; Petitioner bears the burden of proving otherwise. RCW 34.05.570(1)(a). *Pub. Util. Dist. No. 1 of Pend Oreille Cy. v. Dep't of Ecology*, 146 Wn.2d 778, 51 P.3d 744 (2002).

A. The Board's Unchallenged Facts Are Verities On Appeal

Mr. Ritter has not specifically challenged any findings of fact in his appeal. Unchallenged findings are verities on appeal. *Tapper v. Empl. Sec. Dep't*, 122 Wn.2d 397, 407, 858 P.2d 494 (1993). When there has been no specific assignment of error to findings of fact, "the findings become the established facts and our review must be limited

to whether they support the conclusion of law and judgment." *In re Discipline of Brown*, 94 Wn. App. 7, 13, 972 P.2d 101 (1998), citing to *In re Perry*, 31 Wn. App. 268, 269, 641 P.2d 178 (1982). Mr. Ritter's recital of the facts goes well beyond the findings of fact in the Board's final order. Because the facts are not challenged, this Court is limited to the facts as the Board found them.

B. Standard For Reviewing Alleged Errors Of Law

Questions of law are reviewed under the error of law standard. The court determines, *de novo*, whether the agency has erroneously interpreted or applied the law. *Tapper*, 122 Wn.2d at 403; *Franklin Cy. Sheriff's Office v. Sellers*, 97 Wn.2d 317, 325, 646 P.2d 113, (1982), *cert. denied*, 459 U.S. 1106, 103 S. Ct. 730, 74 L. Ed. 2d 954 (1983). But the court accords substantial weight to the agency's view of the law it administers. *Valentine v. Dep't of Licensing*, 77 Wn. App. 838, 894 P.2d 1352, as amended (1995).

C. The Scope Of Review Is Narrow

Mr. Ritter challenges the Board's decision as arbitrary and capricious. In reviewing an order alleged to be arbitrary or capricious the scope of review "is narrow, and the challenger carries a heavy burden." *Keene v. Bd. of Accountancy*, 77 Wn. App. 849, 859, 894 P.2d 582, (1995) *review denied*, 127 Wn.2d 1020 (1995). The question calls for the court to determine whether the agency has engaged in "willful and

unreasoning action, without consideration and in disregard of facts and circumstances." *Heinmiller v. Dep't of Health*, 127 Wn.2d 595, 609, 903 P.2d 433, amended by 909 P.2d 1294 (1995), *cert. denied*, 518 U.S. 1006 (1996). Where there is "room for two opinions, action is not arbitrary and capricious even though one may believe an erroneous conclusion has been reached." *Id. See also Washington Indep. Telephone Ass'n v. Wash. Util. and Transp. Comm'n*, 148 Wn.2d 887, 64 P.3d 606 (2003).

"Action taken after giving [a party] ample opportunity to be heard, exercised honestly and upon due consideration, even though it may be believed an erroneous decision has been reached, is not arbitrary or capricious." *Heinmiller*, 127 Wn.2d at 609–10; *Keene*, 77 Wn. App. at 859–60 (citing *Washington Med. Disciplinary Bd. v. Johnston*, 99 Wn.2d 466, 483, 663 P.2d 457 (1983)).

V. ARGUMENT

A. The Board Had Authority To Discipline Mr. Ritter For Unprofessional Conduct Because His Conviction For Child Molestation Demonstrated That He Was Not Of Good Character And Reputation

Upon a finding of unprofessional conduct, the Board may suspend or revoke an engineer's license. RCW 18.235.110. Unprofessional conduct includes:

> The commission of any act involving moral turpitude, dishonesty, or corruption relating to the practice of the person's profession . . . .

RCW 18.235.130(1). The engineering licensing statutes require engineers to be of good character and reputation as a prerequisite to licensure.

> No person shall be eligible for registration as a professional engineer, engineer-in-training, professional land surveyor, or land-surveyor-in-training, who is not of good character and reputation.

RCW 18.43.040(2). This requirement applies not only at the time of licensure, but throughout the course of an engineer's professional life. Therefore, crimes implicating character and reputation are related to the practice of engineering.

Mr. Ritter argues that the other statute under which he was charged, RCW 18.43.105, does not include child molestation in its prohibited conduct. He agrees, however, that the statute has a catchall provision, RCW 18.43.105(10). Appellant's Br. at p. 12. The statute states that the Board may discipline a licensee for an act which is "customarily regarded as being contrary to the accepted professional conduct or standard generally expected of those practicing professional engineering or land surveying." RCW 18.43.105(10). The Board concluded, moreover, that Mr. Ritter's crimes were "contrary to the conduct and standards generally expected of those practicing professional engineering." AR 158.

The requirement that conduct relate to the practice of engineering does not mean that the conduct needed to occur in the course of the practice of engineering. When a licensee engages in conduct outside the scope of his or her practice, a disciplinary authority can nevertheless take action when the conduct demonstrates a lack of some trait that is necessary to the practice of that profession or if the conduct is contrary to the standards generally expected of licensees. *See, e.g. In re Disciplinary Proceeding Against Day*, 162 Wn.2d 527, 542, 173 P.3d 915 (2007) (citing cases); *Greenen v. Washington State Board of Accountancy*, 126 Wn. App. 824, 831–35, 110 P.3d 224 (2005); *Haley v. Medical Disciplinary Board*, 117 Wn.2d 720, 731–35, 818 P2d 1062 (1991).

Mr. Ritter argues that "good character and reputation" refers only to acts done while in the course of practicing his profession. Appellant's Br., pp. 18–19. This argument cannot prevail, because of the catch-all provision in RCW 18.43.105(10). The catch-all provision must perforce include conduct outside the profession because the good character and reputation requirement applies also at the beginning of an engineer's career, when an engineer cannot yet have a professional reputation. The good character and reputation requirement is a prerequisite to licensure and is one of the minimum competency standards required by the statute that applies throughout an engineer's career. *See* RCW 18.43.040(2). It

would lead to an absurd result if the "good character and reputation" requirement applied only to applicants, and not to licensees.

The Supreme Court explained its reasoning in relating conduct occurring outside the course of the profession to the profession in *Haley v. Medical Disciplinary Board*, 117 Wn.2d 720, 818 P2d 1062 (1991). In *Haley,* a doctor was disciplined for having a sexual relationship with a former patient. The governing law said a doctor could be disciplined for "the commission of any act involving moral turpitude, dishonesty, or corruption relating to the practice of the person's profession." RCW 18.130.180(1). In upholding the discipline, the court stated that the "related to" requirement means the conduct must indicate an unfitness to practice the profession.

> We construe the "related to" requirement as meaning that the conduct must indicate unfitness to bear the responsibilities of, and to enjoy the privileges of, the profession.

Haley, 117 Wn.2d at 731. Though the law allowed doctors to have sexual relations with former patients, the patient in the *Haley* case was underage. In *Haley*, the discipline was proper because the doctor's conduct in forming a sexual relationship with an underage former patient implicated the doctor's trustworthiness. *Haley*, 117 Wn.2d at 734. Moreover, his conduct fell short of what the public expected of a doctor. *Haley*, 117

Wn.2d at 736. Similarly, Mr. Ritter's convictions for three counts of first degree child molestation demonstrate that he is untrustworthy, and is conduct that falls short of what the public expects of an engineer. *See Id.*

Mr. Ritter argues that physicians such as Haley are different from engineers because the public does not accept the treatment and follow the advice of engineers the same way it does physicians. The public does, however, entrust its everyday safety to engineers, which is why they need to be licensed. *See* RCW 18.43.010.

The Supreme Court has characterized the crime of child molestation as "a profound violation of trust . . . ." *Day*, 162 Wn.2d at 542. In considering the disciplinary matter of an attorney convicted of first degree child molestation, the court held that commission of such a crime shows that the attorney is not trustworthy, and cannot be entrusted with his clients' affairs.

A similar situation exists here in the context of engineering. Engineers are required to be licensed "[i]n order to safeguard life, health, and property, and to promote the public welfare." RCW 18.43.010. Engineering ethics courses use textbooks that make clear the high ethical duty, including trust, reputation, and credibility that Engineers have to society as a whole.

> The welfare of humanity involves fundamental moral principles and long-term consequences of present engineering actions. As important as the ability to render technically competent services is the obligation to make for society a better place to live.
>
> Unless they maintain an ethical attitude of unbending integrity which results in placing public interest above all else, there is the risk that engineers will be regarded not as professionals, but as mere technicians. This is because professional status carries with it an implied contract to serve society beyond all other obligations in return for the protection and status that society grants to the profession.

Bill W. Baker, *Engineering Ethics: Applications and Responsibilities, in* ENGINEERING ETHICS: CONCEPTS, VIEWPOINTS, CASES AND CODES, 64 (Jimmy H. Smith et al. eds., 2nd ed. 2008) (excerpts attached in Appendix A).

> History demonstrates that trust, reputation and credibility remain important to the success of individuals, corporations, governments and professions. The engineering profession is no exception. Engineers are entrusted with the highest level of responsibility – protecting the public health, safety and welfare. Recognizing this responsibility, ASCE's Board of Directors defined the profession as a "calling in which special knowledge and skill are used in a distinctly intellectual plane in the service of humanity [in which] there is implied the application of the highest standards of excellence . . . in the ethical conduct of its members.
>
> [. . .]
>
> With the engineer's high privilege comes a concomitant high responsibility – protecting the public health, safety and welfare. Entrusted with the highest level of

> responsibility, the engineers' credibility, trust, reputation, and high ethical standards remain paramount.

Thomas W. Smith III, Esq., *ASCE Ethics: Edict, Enforcement and Education, in* ENGINEERING ETHICS: CONCEPTS, VIEWPOINTS, CASES AND CODES, 108 (Jimmy H. Smith et al. eds., 2nd ed. 2008).

Mr. Ritter argues that the decision in *Day* is distinguishable because Day's victim was a former client. In this sense, the facts in *Day* are distinguishable. It is important to note however, that the Supreme Court posed the question of whether Day could be disciplined even if the conduct occurred outside the practice of law. "This court has clearly established that an attorney may be sanctioned for misconduct that occurs outside the practice of law." *Day*, 162 Wn.2d at 541. The Court went on to say: "conduct reflecting adversely on a lawyer's fitness to practice law can only be found when there is some nexus between the lawyer's conduct and those characteristics relevant to law practice." *Day* at 541, *citing In re Disciplinary Proceeding against Plumb*, 126 Wn.2d 334, 341, 892 P.2d 739 (1995). The Court held that trust is a necessary component of the practice of law, therefore, a violation of trust occurring outside the practice of law still relates to the profession:

> And even if the misconduct were determined to be outside the practice of law, the nexus required by *Plumb* and *Curran* exists between Day's conviction for child molestation and his unfitness to practice law because his

> crime involved a profound violation of trust, a necessary component of the practice of law.

Day, 162 Wn.2d at 541–42.

Mr. Ritter attempts to distinguish *Day* on the basis that the attorney there used his professional position to gain the trust of his victim and the mother. Here, Mr. Ritter did not use his position as an engineer to gain the trust of his victim. Child molestation is nevertheless a profound violation of trust. The Board explicitly found "The victim of Respondent's crimes was his daughter who was less than 12 years old at the time of the crimes." AR 157. This recognizes that children are vulnerable with respect to their elders, and, in particular, a father has a position of trust in his household. If an engineer is willing to betray the trust of the people who rely on him the most, society should not be expected to rely on that trust.

The Board is entitled to take disciplinary action against an individual who engages in conduct that is contrary to the principles the public expects from a licensee, regardless of whether it expressly involves the individual's professional practice. In *Greenen v. Washington State Board of Accountancy*, 126 Wn. App. 824, 110 P.3d 224 (2005), the Board disciplined Greenen for lying about her dependents on an insurance benefits application. Greenen argued that her application for insurance

benefits was a private matter and not within the scope of her practice as a Certified Public Accountant. The Court of Appeals disagreed:

> Greenen asserts that she can escape the Board's discipline because she repaid the Port for the improperly incurred premiums. But this contention ignores the Board's findings in the final order that Greenen's conduct is contrary to the principles that the public expects from a licensed CPA. [. . .] These facts and circumstances are not so personal as to invalidate the Board's jurisdiction under [the statute].

Greenen, 126 Wn. App. at 837.

Mr. Ritter attempts to distinguish *Greenen* on the basis that in that case, the Board made findings of fact that related her conduct to her profession. Mr. Ritter did admit, however, during the administrative proceeding "that there was a violation of a position of trust between himself and his victim." AR 141. And he does not dispute that the crimes occurred. Mr. Ritter argues that because he committed the crimes outside the practice of his profession, his profession is not implicated at all. In fact, as demonstrated above, conduct occurring outside the profession can be related to the profession, particularly, when, as here, is egregious and affect the public's ability to trust him.

B. The Board Was Proper In Relying On Its Expertise When Finding Mr. Ritter's Conduct Unprofessional

No expert is required to tell the Board what the essential elements of the practice of engineering are. The Board may rely on its own

expertise to draw inferences from the facts and determine that child molestation demonstrates a lack of those characteristics required to be a professional engineer. *See e.g. Ames v. Wash. State Health Dep't Medical Quality Health Assurance Comm'n.*, 166 Wn.2d 255, 208 P.3d 549 (2009); *Davidson v. Dep't of Licensing*, 33 Wn. App. 783, 785, 657 P.2d 810, (1983) *review denied*, 99 Wn.2d 1011 (1983); *See Wash. State Med. Disciplinary Bd. v. Johnston*, 99 Wn.2d 466, 482, 663 P.2d 457 (1983). The Board is, after all, made up of members of the profession and has the knowledge to apply the facts in this case to the law that permits the Board to sanction Mr. Ritter.

An administrative agency may use its experience and specialized knowledge to evaluate and draw inferences from the evidence when finding unprofessional conduct. *Davidson v. Dep't of Licensing*, 33 Wn. App. 783, 785, 657 P.2d 810, (1983) *review denied*, 99 Wn.2d 1011 (1983). The seven-member Board is composed of five registered professional engineers and two registered professional land surveyors. RCW 18.43.030. Consequently, it is logical and proper for the Board to draw its own conclusions as to acceptable standards for engineers, and what conduct is expected of engineers. *See Wash. State Med. Disciplinary Bd. v. Johnston*, 99 Wn.2d 466, 482, 663 P.2d 457 (1983). As to such

specialized matters, the courts give deference to administrative expertise. *Johnston*, 99 Wn.2d at 482.

Washington's Supreme Court decided last year that a specialized medical board (MQAC) did not need expert testimony on the issue of standard of care in the profession. *Ames v. Wash. State Health Dep't Medical Quality Health Assurance Comm'n.*, 166 Wn.2d 255, 208 P.3d 549 (2009). The Court focused on whether the evidence supported the Department's factual allegations, not whether the evidence supported the Commission's rulings regarding the proper standard of care:

> Generally, Washington law does not require that expert testimony be provided to MQAC [. . .] and allows for the members to use their own expertise to evaluate various factual questions before them and to "draw inferences from the evidence presented to them." [. . .]

Ames, 166 Wn.2d at 261, *citing Davidson*, 33 Wn. App. at 785. As the Board in this case is comprised of professionals with relevant expertise, similar to the Commission in *Ames*, a similar analysis should apply. The Board, based on undisputed evidence of Mr. Ritter's convictions, can draw its own inference that those convictions are inconsistent with the standards of conduct expected of an engineer, and are contrary to the requirement of good character and reputation in the statute. It was not arbitrary and capricious for the Board to reach that conclusion here.

Therefore, the acts are sanctionable under Washington's licensing scheme because the Board may find that convictions for child molestation relate to the practice of engineering in that child molestation demonstrates a lack of good character and reputation required by the statute.

VI. CONCLUSION

Washington law allows the Board to draw inferences from the undisputed facts in this case. Therefore, the Board may properly conclude that child molestation is related to the practice of engineering because Mr. Ritter's "crimes are inconsistent with the statutory requirements of good character and reputation" and because they "are contrary to the conduct and standards generally expected of those practicing professional engineering." AP 158. The Board properly concluded that Mr. Ritter no longer met the minimum statutory qualifications to be an engineer when he pled guilty to three counts of first degree child molestation.

RESPECTFULLY SUBMITTED this 14th day of April, 2010.

ROBERT M. MCKENNA
Attorney General

for Bruce Turcott
WSBA #15435

JODY LEE CAMPBELL
Assistant Attorney General
WSBA No. 32332
PO Box 40110
Olympia, WA 98504-0110
(360) 753-2702

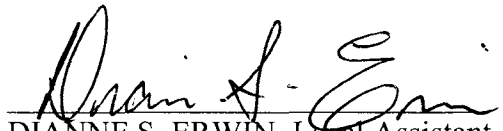
PROOF OF SERVICE

I, Dianne S. Erwin, certify that I caused a copy of this document, **Respondent's Brief**, to be served on all parties or their counsel of record on the date below by US Mail Postage Prepaid via Consolidated Mail Service, and via electronic transmission to:

Saxon Rodgers
Attorney for Appellant
324 West Bay Dr. NW, Suite 201
Olympia, WA 98502
e-mail: saxr@buddbaylaw.com

I certify under penalty of perjury under the laws of the state of Washington that the foregoing is true and correct.

DATED this 14th day of April, 2010, at Olympia Washington.



DIANNE S. ERWIN, Legal Assistant

FILED
COURT OF APPEALS
DIVISION II
10 APR 15 PM 2:27
STATE OF WASHINGTON
BY
DEPUTY

Engineering Ethics

Concepts, Viewpoints, Cases, and Codes

Second Edition © 2008

Compiled, Edited and Published by the

National Institute for Engineering Ethics
Murdough Center for Engineering Professionalism
College of Engineering, Texas Tech University

TEXAS TECH UNIVERSITY
National Institute *for* Engineering Ethics

Authors and Editors

Jimmy H. Smith, PhD, PE, F.ASCE, F.NSPE
Professor of Civil Engineering and Director

Patricia M. Harper
Unit Coordinator and Deputy Director for Operations

Richard A. Burgess, MA (Philosophy)
Research Associate and Deputy Director for Distance Learning

Engineering Ethics: Applications and Responsibilities

By Bill W. Baker
Former Murdough Center Editor & Project Executive, Retired
Former Assistant Dean, College of Engineering, Texas Tech University

Because of many examples of contemporary greed, the public is demanding that virtue be taught to those who would be professionals and that ethical conduct and professionalism be demanded of those who are practicing within the professions. This may be an impossible-to-meet demand because controversy has swirled since the days of ancient Greece and Rome as to whether values can be taught after the formative years which some refer to as "sandbox" years. This article will address the purpose of teaching ethics, some basic concepts, the importance of moral reasoning, standards and law, safety and risk, and responsibilities of professionals. It will also include a brief section on international ethics.

Purpose

The feeling by some that current attempts to teach ethics do not seem to do much good may have its roots less in the philosophical arguments as to whether ethics can be taught than in the real-world where many present-day scholars think that such attempts would be less worthy than more traditional courses. Beyond that, most professors in such areas as science, engineering and business have had little exposure to formal instruction in ethics and values and even less experience in teaching them. Furthermore, they are less inclined to teach such subjects than those which have definite right and wrong answers. Teachers tend to teach those things which they are most comfortable teaching.

Current disagreements about the teaching of ethics are not new. If we go back about 2,500 years to Athens, Protagoras was writing and teaching that truth is just a matter of convention and that it is relative to each person's point of view. Socrates' position was that this is exactly wrong, that real truths can be determined, and that they determine human values. Plato's argument was the same, and he said that Protagoras and his pluralistic followers had no respect for the truth. Once values are made relative and subject to scholastic or social whimsy, wisdom is conformity and truth is politics, he claimed. Not a single ancient Greek philosopher ever defended Protagorean relativity, yet modern pluralists explicitly espouse Protagoreanism. Many in U.S. society today hold pluralistic beliefs.

Perhaps truth falls somewhere in the middle, being unable to live with complete dogmatism or relativity. Instead, there must clearly be some room for mutual understanding. Perhaps virtues cannot be taught, but each person can learn to reason. That, then, becomes the goal of those who are attempting to teach courses in ethics. It is not to provide hard and fast "yes" and "no" answers but to generate awareness of ethical concerns and dilemmas, to disarm prejudices, and to bring about more value laden professional behavior.

Basic Concepts

Depending on how one wants to look at it, the history of engineering may be thought to be nearly as old as man. It could be related to the development of crude stone tools, the use of fire and, later, the wheel. If one seeks to define its historical limits by its search for professional status, then its history is much more recent and is basically the history of its societies, or roughly the past century. To get to the roots of its organized concern with engineering ethics, a study of the past two decades will cover the issue.

Those interested in a historical statement are referred to a 1971 book by Edwin T. Layton, Jr., *The Revolt Of The Engineers*, published by the Press of Case Western Reserve University. It traces the evolution of engineering and its search for professional and political status. Others would say that what is professional in technology may go back farther than the 1800's and the establishment of professional societies. They point to the various crafts and guilds and the apprenticeship programs of the medieval period. Rather than a book, they would refer you to a performance of the Wagnerian opera, "Die Meistersinger", for a look at what early engineering was like with its system of masters and apprentices. In any case, it was at this time of the breakdown of the feudal system that crafts found it necessary to join together into guilds for mutual protection and regulation.

Even before 2,000 BC, Egyptian hieroglyphs used the title "chief of works" to describe that era's technologist whose duties were somewhat like those of today's city engineer. The University of Miami's Murray I. Mantell, writing in his book, *Ethics and Professionalism in Engineering*, says that almost every form of engineering was known to the civilizations of antiquity which included Egypt, China, Persia, Chaldea, Babylon, Assyria, Phoenicia, Etruria, Palestine, Moab, and Peru where canals, public water supplies, docks, harbors, lighthouses, bridges, roads, and massive structures were built. Mantell continues by saying that people doing engineering type work tested the strength of materials, planned fortifications, designed engines, devised methods for transporting heavy objects, developed systems of navigation and communication and were skilled metallurgists.

Mantell relates a series of 19th Century inventions to the recent radical change in engineering. Included in these inventions were Carnot's theory of the development of the steam engine in 1824, the introduction of the dynamo and the electric generator in 1831, the telegraph in 1836 and the electric lamp in 1880. He also credits the westward rush to gold by the 49ers as the event which provided the incentive and the money for major advances in mining engineering. Bessemer's 1856 improvements in steel making and the 1868 introduction of reinforced concrete were major steps forward. All of these presented engineers with new needs and new opportunities and gave the profession a body of mathematics and science that could replace or supplement the art and crafts of earlier times. Time-wise, this corresponded with the rise of the American university and with the emergence of a fundamental cultural belief in the value of learning, or "scientific expertise."

In a section called "The Engineer and Society" Mantell postulates that it was the rapid growth of the American West which resulted in a shortage of experienced

engineers apprentices, thus leading to the initiation of college training for those who would be engineers and who would take advantage of the new science and math, even if it did mean being subjected to the ridicule of old "practical" engineers. Remnants of that attitude are encountered even today. The rapid growth in the formal training of engineers is shown in this statistic: At the time of the Civil War, the United States had four engineering schools. Thirty years later that number had grown to 89.

Internationally, the first engineering professional societies began in France. French army engineers organized as the Corps du Genie in 1672, and the French national highway department's engineers formed the Corps des Ponts et Chaussees in 1716. More than a century later, in England, the Institution of Civil Engineers was founded in 1818. This was followed in 1847 by the Institution of Mechanical Engineers. Early engineering societies in America developed in the following order:

American Society of Civil Engineers, 1852;
American Institute of Mining, Metallurgical and Petroleum Engineers, 1871;
American Society of Mechanical Engineers, 1880;
Institute of Electrical and Electronic Engineers, 1884, and the
American Institute of Chemical Engineers, 1908.

Called the Founder Societies, these groups were subsequently joined by the National Council of State Boards of Engineering Examiners, the American Society for Engineering Education, the American Institute of Aeronautics and Astronautics, the Accreditation Board for Engineering and Technology, the National Society of Professional Engineers, Canada's Engineering Institute and a number of other important professional societies. Though each group has a different set of goals, a thread of commonalty running through them all is the goal of insuring professional performance while seeking professional recognition.

Moral Reasoning and Dilemmas

The Hastings Center was established in Washington, DC slightly more than a score of years ago to study ethical problems. A number of the ideas expressed in this section of the workbook are based on Hastings Center studies.

There is a strong relationship between the teaching of ethics and the development of moral behavior even though virtues may not be something which can be taught once the formative years are passed. Our approach in this course is to introduce disciplinary and methodological perspectives of ethics that relate to professionals. We seek to sensitize students to ethical concerns by providing them with concepts and skills that will help them recognize and deal with moral issues which affect them personally, their profession and society in general.

As the students progress through this course, the expectation is that, using Hastings' words, their "moral imagination" will be whetted and that they will come to quickly recognize ethical issues. Moral imagination refers to emotions and feelings, but for the course to be worthwhile, it needs to carry beyond that. It should carry to the point where emotional response gives way to conscious rationality when appraising and judging ethical dilemmas.

Because technical problems may be fundamentally right or wrong, a course in ethics should aim to provide skills and knowledge to understand the moral implications of decisions concerning the applications of technology. When thinking of skills, it is customary to think in terms of tools whose use requires special skills. Tools for evaluating moral consequences are concepts, rules and principles. With them, students may work their way to ethical conclusions. What can't be left out of the final conclusion is that the individual has the freedom to choose and the responsibility for his choice. Answers won't be found in this course, but what may be discovered is the way to arrive at a personal best answer.

Professionals, accustomed to dealing with problems for which there are provable wrong and right answers may not be turned on to the idea of using concepts, rules and principles of philosophy, but classical philosophy has real worth as a problem solving tool. The necessary function of analytical philosophy is to make clear the most appropriate way to approach problems in professional ethics, even though it does not provide definite answers to ethical dilemmas. Without a philosophical structure for guidelines, answers are apt to be directionless and inconsistent. Thus, at least some study and understanding of philosophy must be a part of any course on professional ethics.

Without a patterned way to approach the problem of making choices, freedom to choose may not be worth much.

It follows from the above that ethics is a subject which provides guidance for conduct while ethical theory tries to answer questions about ethics. Some degree of familiarity with both is necessary for an understanding of this course. Some have said that ethical theory is the concern of philosophers while ethics is or should be the concern of ministers and guidance counselors. Fortunately for those who are faced with ethical dilemmas which require them to decide how and why to act, this attitude has largely disappeared. It has been replaced by one which combines ethical theory with a study of moral issues.

Applied ethics has its roots in this development.

Standards and Law

Forces of machines, forces of nature, forces resulting from economic, social and political life — these all come together in technological developments. Because of the unknowns in all of the diverse areas, there are risks that can only partially be forecast or diagnosed. This, in itself, makes engineering an experiment and means that engineers are the experimenters. From this complex milieu rise some aspects of the engineer's concerns about safety and his/her responsibility for the general health and welfare of nature and humans.

As MIT's Langdon Winner commented in his 1977 book, *Autonomous Technology*, technological developments shift the fashions of the moment and open areas both of insight and blindness. Technology is problematic and a source of concern because it changes within itself and it generates other changes in its wake. Winner continues by saying that modern history is characterized by continuous change and that "somehow machines and other manifestations of new technology are at the center of this process. ... To look for

crucial questions is to look for inventions, innovations, and the myriad of ramifications that follow from technological change."

Another question is not whether technological changes will occur but whether, with the changes, risks can be controlled and safety reasonably assured. If it is to be controlled, how and by whom become the next questions. Engineers, individually and as a group, have roles to play in the controlling process that are as great as their roles in the development process. The engineer is pivotal because his education and experiences have equipped him to bring about new technology, to anticipate its benefits, to forecast problems or risks, to assess alternatives and to inform the publics which make up society. His/her responsibilities stem from the fact that the work is experimentation and he/she is the experimenter.

Many examples abound of technology gone astray, such as Chernobyl, Challenger Shuttle, Three Mile Island and Bophal. These types of new technological developments offered tremendous social promise but delivered unanticipated or unannounced social disasters, and they are at the root of much of today's public outcry for greater exercise of ethics and responsibility by technologists. Related to this is the fact that within the profession, some claim that codes of ethics adopted by the societies provide neither adequate guidance nor protection to help them meet their expanding responsibilities.

Because the effects of technology reach into every area of modern living, it is not surprising that laws have evolved to protect the public interest. So have regulatory bodies. It would seem to follow from this that laws which protect ethical engineers would have emerged since the ethical practice of engineering has come to be so highly regarded as a means of protecting the public. Unfortunately, that has not occurred. Still, to a greater extent than before, the law has become a major element in the practice of engineering.

With increasing frequency, engineers find themselves in the position of being expert witnesses in courts and other kinds of legal hearings. In this instance, there is a major distinction between ethics as they relate to the lawyers and to the expert witnesses. It is the lawyer's obligation, while avoiding untruths, to present the strongest possible case for his client. There is no obligation to present all pertinent information or to present a balanced case. It is the adversarial courtroom setting that is supposed to bring out the balance and the full truth as a result of the combined presentations of the litigants.

Scientists and engineers, when appearing as expert witnesses, have an obligation to present to the best of their abilities, accurate and complete accounts. As Stephen Unger pointed out in his book, *Controlling Technology: Ethics and the Responsible Engineer*, the conscious suppression of data to create a biased impression is a serious breach of ethics. Expert witnesses are also obligated not to accept assignment as expert witnesses unless they, in fact, are experts in the area. Even then, they are obligated to familiarize themselves as fully as possible about the subject on which they are to express their expertise.

It might be lucrative in the short run for an expert witness to slant testimony in favor of the person who is paying his bill, but the long-term result of that is a loss

of credibility for the engineering profession and a lowered personal reputation. Slanted or incomplete testimony is a clear violation of ethics.

It is interesting that opinion is normally excluded from trials, yet opinion is what the expert witness gives. It is one of the things which makes that person special and which imposes a keen level of ethical responsibility. An expert is a person who has the experience and training to provide him with special knowledge or skills in a particular field that most people would not have. In the case of an expert witness, qualifying before the court is a part of the testimony. In this qualifying, the expert witness is apt to be asked about his background, education, registration, society membership, projects and other related items while the court determines whether he truly is qualified to give expert testimony.

The ethical obligations that are so apparent in expert witness testimony are equally demanding in other areas where an expert may be involved in assisting an attorney with the interpretation of technical matters in case preparation and assisting in examining and cross-examining technical witnesses. It is not only necessary that the expert make himself understood by the judge and the attorneys but also by the jurors, most of whom may have no technological sophistication. Obviously, it follows that an effective expert witness must not only have technical skills but also communication skills. Because it is the job of the opposing counsel to pick apart and tear down the expert's testimony, it is necessary that the witness be professional in appearance, conduct and attitude and that his answers be reasoned and calm. Breakdowns in courtesy and self-control simply must not occur.

Being an expert witness is demanding and may be exasperating. The consequences can be tremendous. Therefore, considerable thought should be given to whether the task ought to be accepted. The truth must be told as the expert sees it, so he should not accept as a client someone in whose position he does not have confidence. Once accepted, the professional approach is to charge fees that would be charged for other important work requiring the same level of time and participation. Setting a fee on a contingency basis should not even be considered and would be regarded as highly unprofessional.

ASFE, professional firms practicing in the Geosciences, (http://www.ASFE.org) has excellent materials for professional practice issues such as expert witness testimony.

Concern for Safety and Risk

Cost, benefit, and risk analysis are critical areas in engineering concerns for safety. Since total safety is more a goal than an achievement, trade-offs are involved in most such decisions. The area is covered to some extent in the text by Martin and Schinzinger. Still, risk assessment and cost/benefit analysis, especially when they move from dollar areas to the human values and moral values arena become highly nebulous and getting a handle on them is difficult. The fact that we can neither fully explain them nor avoid them makes it appropriate that additional information on the subject be introduced.

Two books which might be read by those with a particular interest in cost/benefit/risk analysis are *Risk In The Technological Society* by Christopher

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Hohenemser and Jeanne X. Kasperson, and *Societal Risk Assessment* by Richard C. Schwing and Walter A. Albers, Jr. A third good source is *Project Evaluation* by Arnold Hardberger. The March 1982 issue of IEEE *Technology And Society* magazine deals with an interesting concept of cost/benefit analysis with the introduction of what author, Carl Barus, calls "malefits" as an additional item in the cost/benefit equation. He says that both the desired effects (benefits) and the undesired effects (malefits) are outputs of technology. Rather than trying to separate costs and benefits, he says the costs are the money paid for the mixture of benefits and malefits or undesired effects actually produced. He goes on to claim that dollar quantification of benefits and external costs obscures, not clarifies, the actual physical and social effects of technology. Cost/benefit analysis, to him, is a better tool for advocacy in technological decisions than for informing the public.

Given the complex nature of cost/benefit analysis and the ethical concern that it substitutes money values for social values, one should not be surprised that it is a technique which is frequently criticized. The problem is that until other criteria are put forth, public interest will continue to be measured chiefly in terms of dollar flow. It is very likely that an objective measure of social benefit simply cannot be developed. If that is the case, then the criticism must be answered by better communication between policy makers and those who will be affected. Only then will the public feel that it has some leverage for controlling decisions.

According to Barus' theory, if policy makers use only economic costs that can be measured to arrive at benefits, society stands to lose priceless assets. If analysis shows dollar benefits to exceed dollar costs, projects are presented as desirable, when "real" costs, even if unquantifiable, may exceed "real" benefits. This amounts to misleading the public, intentionally or otherwise. It is in this area that ethics enters what is otherwise a "bean counting" exercise.

Given that technology is one of society's major instruments of change, it follows that its design and assessment ought to be based on broader considerations than amoral economics. The resulting quandary is that when unquantifiables dominate, the quantitative portion of the analysis is meaningless. The obligation, at this point, becomes one of explaining assumptions and premises as an unbiased professional rather than as an advocate. The politicians will become the advocates and that is unavoidable, because some technological decisions ultimately become political decisions. In such cases, the engineer does not get the final say. From a professional perspective, this is called "market subordination." The public, therefore, needs honest words from engineers if it is to reasonably evaluate technological activity.

Utilitarians think of cost benefit analysis as being a study of what will be the greatest good for the greatest number for the longest period of time at the least cost. Those seem, on the surface, to be exquisite measures until one considers that what yields the most good to the majority sometimes comes at a horrible cost to the minority. In such a case, decision makers, where they decide to do the greatest good for the greatest number, may be both unethical and immoral because of what their decisions do to a few. When measuring costs and benefits, the tendency is to assign more worth to certain individuals or groups than to others.

From a purely economic standpoint, net benefits will be maximized when the scale of development is extended to the point where the benefits added by the last increment are equal to the cost of adding that increment. This is called marginal theory and means that the low cost point is the one where marginal benefits or marginal revenue equal marginal cost.

When we begin to consider human benefit and human worth and good and evil and whether all are of equal value and the other myriad ethical concerns which surround every major project, the final decision hinges on making the best choice from the available alternatives. Considerations have to not only include what is the most economically efficient — and this must be included because economic efficiency does contribute to social welfare — but also that which achieves ethical goals such as justice, health and amity. Welfare maximization is as important in cost/benefit analysis as is the achievement of economic objectives. The following is extracted from *Societal Risk Assessment* and is presented as an example of the complexity of cost/benefit/risk analysis which attempts to apply a holistic approach:

"The most obvious characteristic of this class of problem is what Daniel Callahan in his 1979 book, *Morality and Risk Benefit Analysis*, calls inherent uncertainty. The uncertainty built into the very nature of the problem is dominated by the difficulty in obtaining good, solid, scientific data and, possibly more important, by the even greater difficulty of getting a consensus on what is important. With differences in age, experience, goals, demographics and psychology, various groups are bound to approach a problem with a different set of perspectives and the alleged 'facts' brought to the analysis — that is what are chosen to be called facts — may differ radically from those chosen by a different group having a different value system.

'Values' and 'facts' are inseparable and we must avoid the hazard of assuming that better science could perfectly answer the question: 'How safe is safe enough?' We cannot be distracted from the more difficult issue of making decisions in the face of substantial uncertainty in either a technological or non-technological society, each carrying a burden of evident and hidden risks. These risks await the individual and even society itself, but to avoid all risk would lead to the ultimate risk of stagnation and 'rotting in a trap of safety'."

Maybe the best summation of value differences within nature was shown in a drawing of two seabirds, one a herring gull and the other an oystercatcher. One sketch showed a contented gull, sitting on an empty nest, oblivious to the fact that an ethnologist had removed the eggs to see which the creature would prefer, and it settled for the nest. The other sketch showed an oystercatcher trying to sit on a monstrous egg, larger than itself, ignoring its own egg which was a manageable size. Again the ethnologist had provided the dummy to test the discrimination of the bird. Gulls prefer the nest to the eggs; with oystercatchers, bigger is better. Human values range through a similar scale, and these values have to be considered when safety and risk are analyzed.

There are times when, regardless of the benefits associated with a project, risks are at such a threshold that the decision is an automatic "no go." The estimation of risk is as complex as is the estimation of benefits or total costs. A complicating factor is that risk analysis is imprecise partly because people assign

different levels of acceptability based on who subjects them to it and who it is that is being put at risk. People who rock climb, sky dive or fly hang gliders subject themselves to risks that they would not accept from an employer. Still, they will accept risks from an employer that they will not tend to accept from society in general. As Aaron Wildansky said of risk reduction: "Each of us would do less for ourselves than we would insist that the government do for us."

Risk is also complex to assess because risks from technologically related projects fall into two separate categories. One is the routine, expected risks associated with the design and found to be acceptable at the time the project is studied, while the other is from abnormal conditions that are not part of the normal operation of the basic design concept. There is also the case of "acceptable risk." Acceptable to whom? Who makes that decision? Are the considerations physical risk or financial risk or both? Are these risks distributed across time as with the oil industry where a number of people are killed annually or simply subject to disastrous accidents where many might be killed in a rare accident, such as a nuclear accident. In another case, is the air and acid rain pollution from coal preferable to the risk of a nuclear accident?

As if they were needed, there are still more complications such as the clash of analytical and intuitive risk assessment. Analytical assessment says that airplane travel is safer than automobile travel, yet more people have an intuitive disabling fear of flying than of riding in an automobile.

As with the case of cost/benefit analysis, with risk/benefit issues, one of the engineer's ethical responsibilities is to explain scientific and technical options to the public so the layman can make an informed judgment, because consensus is unlikely to develop and political decisions will probably be called upon to settle the issue. Said differently, some say the special responsibility of the engineer is to determine risks; it is not to judge their acceptability. Others say, by virtue of his or her expertise, the engineer is uniquely positioned to do a superior job of "judging acceptability."

Responsibilities and Employer Authority

Late in the World War II period W. J. King wrote a three-part article which in 1944 was published in the May, June and July issues of *Mechanical Engineering*. It has been republished a number of times with his permission in books by other authors. It would take much searching to find a better prescription of "ought to" than the King article in regard to the engineer's responsibilities in his work relationship, his relationship with his boss, and his responsibility to associates and outsiders.

Part II of the King article deals with duties and responsibilities of engineers who are in executive or supervisory positions. Here he covers such areas as individual behavior and techniques, his responsibilities to his organization and his obligations to his personnel.

Part III covers purely personal considerations for engineers such as character and personality, both of which are inextricably tied to professionalism. A good source for this article, perhaps better than nearly 50 year old issues of the publishing periodical, is the earlier referenced Mantell book, *Ethics and*

Professionalism in Engineering. In that book, the King article, along with its bibliography, is Appendix A and is recommended reading. It reduces ethics to its most practical and applied sense.

Describing responsibility from a different perspective, H.L.A. Hart, in his book *Punishment And Responsibility*, (Oxford University Press, 1968) wrote of four different kinds of responsibility:

1. role responsibility,
2. causal responsibility,
3. liability responsibility, and
4. capacity responsibility.

Reviewers have said that he might as well have been writing about corporate responsibility as professional responsibility, because a corporation can have all of those responsibilities. Role responsibility goes with roles, tasks and jobs; causal responsibility is what you get when you cause something to happen; liability responsibility deals with who pays; and capacity relates to competence.

What sets the professional apart from the corporation is moral responsibility. Whereas corporate responsibility tends to look backwards to responsibility for what happened, much of engineering responsibility must be forward looking and not only deal with "can we do it," but also "ought we do it and, if we do, can we manage it?"

Corporations need not be immoral, they are just amoral or non-moral, whereas engineers must be moral to be responsible, ethical and professional.

Another area in which there is sometimes conflict is the matter of unionism. It matters not that employee engineers have frequently benefited from union activity, the aversion that professionals have for unions is long and deeply rooted. Membership in unions is regarded as a clear erosion of professionalism, but in some professions, this is occurring. See *"Proletarianization Of The Professional"* by Martin Oppenheimer. Professional ethics require complete honesty while union politics rewards, even necessitates, diplomatic double-talk. This conflict makes it nearly impossible for engineers who want to be seen as "hound's tooth" clean in their professional work to engage in the less savory aspects of union politics.

Further complicating the issue of engineer unions is the fact that some engineers are employees, while other engineers are employers or part of the management team. Unionizing one group and exempting the other has the potential for a variety of conflicts and the likelihood of dividing the profession against itself.

A primary difficulty in the area of responsibility relates to sometimes conflicting values confronted by engineers who work in industry. Robert Jackall, writing in his book *Moral Mazes*, points out that part of the ethical conflict or dilemma that faces engineers in industry relates to industrial management. Managers constitute less than 10% of the work force, but they are the quintessential bureaucratic work group in our society. They are by, of and for the organization. Unlike members of professions or public servants, they avow no allegiance to civil service codes or to a public service ethic. Their allegiances are only to the principles of the organization, to the markets which are themselves

bureaucratically organized, to the groups and individuals in their world who can demand and command their loyalties, and to themselves and their careers.

Continuing his listing of accusations, Jackall says managers' bureaucratic work poses a series of dilemmas that often demand compromises with traditional moral beliefs. Management wants, even demands, a team that works well together and does not tolerate those who say: "I don't want to do that." What this really means sometime is going with the flow and not making waves. This is especially true during times of crisis. This is also the time when ethical protest or whistle blowing is most likely to occur and it is not the time for it. Clearly Jackall is not an admirer of contemporary managers.

Management's ethics are notable for their lack of fixedness. In the corporate world, morals do not emerge from a set of internally held convictions or principles, but rather from ongoing and changing relationships. Because bureaucracies are always situational and relative, so are ethics. In this environment, ethics are more pragmatic than idealistic.

Some managers say that in business, when the planning is over and the operation begins, there is no room for abstract ethical and moral principles. They further say that truth is socially defined and is not absolute, making them little more than pluralistic Sophists. Therefore, compromise about anything and everything is not a moral defeat but an inevitable fact of organizational life. Right is irrelevant when authorities declare it to be wrong. They add that this is necessary because "what makes a corporation work at all is the support we give to each other no matter what happens...We have to support each other and we have to support the hierarchy. Otherwise, you have no management system." The logical result of altering goals to fit expediency is the elimination of any ethical lines at all, concludes Jackall.

Whether one agrees with Jackall's strong attack on managers, one must agree that corporate values are thrown into frequent and sometimes violent conflict with engineering ethics and standards of professionalism. Even where corporate responsibility is high, it tends to be historical and backward looking in its perspective, whereas, as Hunt wrote, engineering ethics and responsibilities have to be forward looking. What does this say for the ethical dilemmas faced by engineers who are also managers? If there is a difference between corporate or managerial ethics and engineering ethics, which should prevail when the manager or corporate officer is an engineer?

Moral Obligations and Rights of Professionals

As is regularly pointed out in the literature, being a member of a recognized profession carries with it certain responsibilities, responsibilities which comprise a large part of what this course is all about. But professionalism is not a single edged sword which cuts only one way. Being a member of a profession also carries with it rights. Writing on this subject in American Society of Civil Engineers' Journal of Professional Issues in Engineering, October 1985, Murray A. Muspratt of Chisholm Institute of Technology, Victoria, Australia, suggests a bill of rights which apart from constitutional rights and legal rights would include such ethical rights as:

1. The right to act according to ethical conscience and to decline assignments where a variance of moral opinion exists.

2. The right to express professional judgment, and to make public pronouncements that are consistent with corporate constraints on proprietary information.
3. The right to corporate loyalty and freedom from being made a scapegoat for natural catastrophes, management ineptitude or other forces beyond the engineer's control.
4. The right to seek self-improvement by further education and involvement in professional associations.
5. The right to participate in political party activities outside of working hours.
6. The right to apply for superior positions with other companies without being blacklisted.
7. The right to due process and freedom from arbitrary penalties or dismissal.
8. The right to appeal for ethical review by a professional association, ombudsman or independent arbitrator.
9. The right to personal privacy.

All people may not agree with each of these proposed rights, and it is clear that some have been violated in well publicized cases. While not in the same format, they are similar to the Employee Bill of Rights that authors Schinzinger and Martin reference in their text.

A major difference between employee rights and professional rights is the right of professional conscience which is of utmost importance to the professional. Though the concept of professional conscience is nebulous, it is the shelter for a variety of moral responses, among them being whistle-blowing. While the right of professional conscience is the umbrella for whistle-blowing, often it is a leaky umbrella and is not an effective protector.

Not new, but an excellent article for review by those who want a thorough treatment of whistle blowing, from knowing how to knowing when to knowing where some of the most prominent of the whistle blowers are now, is "Knowing How to Blow the Whistle" by Tekla S. Perry. This article was published in the September 1981 issue of IEEE SPECTRUM and should be generally available in the periodical rooms of libraries.

Another good article on the subject of whistle blowing is an essay "In Defense of Whistle Blowing" by Gene G. James, Philosophy Department, Memphis State University. Copyrighted in 1984, it is published on pages 249-269 of a book *Profits And Professions* which was edited by W.L. Robinson, M.S. Pritchard and Joseph Ellin and published by Humana Press.

The very societies and institutions which stress ethical values that are grounded in personal responsibility and public accountability have been weak in protecting whistle-blowers from harassment, dismissals, and the expense of law suits. In making this point, Bertrand G. Berube, an engineer, a former GSA regional administrator, a whistle blower and now an owner of his own business, told American Society for Engineering Education members at their 1987 meeting: "If you blow the whistle on a boss, you are likely to be without a job for three to four

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months and legal fees will be in the range of $30-40 thousand; for blowing the whistle on a government agency, you may expect to be out of work for one to two years and your legal fees may run from $125-150 thousand. If you blow the whistle on the political administration in power, you may be off the job for four to seven years and legal fees may be in the $400-550 thousand range."

That is a high price to pay for subsequent recognition by your professional society for your dedication to professionalism, but it, unfortunately, has been the experience of many who chose to exercise their right to blow a whistle when they felt that engineering ethics demanded such drastic action.

International Ethics

Since the early 1970's, approximately one half of all graduate engineering degrees and 20% of the undergraduate degrees granted by US schools of engineering have gone to foreign students. During this same period, very few US students have earned engineering degrees in foreign institutions. This means two things. The multinational nature of much of US industry is such that large numbers of US engineers are practicing in foreign countries though working for US firms. The flip side is that great numbers of foreign engineers are working in the US, many having US degrees and most of them working for US firms. The US engineers working overseas for US firms are not allowed, if they subscribe to the codes, to follow the "When in Rome" philosophy. Conversely, many of the foreign engineers practicing in the US have achieved or seek US permanent residence or citizenship and by virtue of their employment by US firms, "When in Rome" or in this case "When in the US" does apply.

Ethics and moral values from which many of these come are quite different from those in this country, and concerns are arising that the potential exists for a serious and growing problem. Some examples are:

When in 1992 the European Economic Community became a fact rather than a plan, the engineering profession was faced with new challenges, opportunities and problems because of what it implies for the practice of foreign engineers in the US and for the US engineers in practice in foreign countries, especially within the European community. We had to get our registration act together. If we do not even have consistent reciprocity between the states, how can we expect free and open opportunities for our engineers within the EEC? If we are given that, how can we accord their engineers the same access to US practice?

Professional Ethics Report, newsletter of the American Association for the Advancement of Science, summer 1989 issue, comments that the professional recognition programs that are developed among the nations comprising the European Economic Community will make for tremendous opportunities or tremendous problems for US engineers. It raises hopes that for the first time an international credentialing procedure may develop whereby professional engineers from the US and other nations could practice freely throughout the world. Critical to this will be whether the US gets its act together, because US engineers can become familiar with barriers without going abroad; they can simply cross a state line. It seems that the EEC is ahead of the US on this point of creating a single market for recognizing professional credentials.

Recently NSPE, NCEES and ABET have established the Council for International Engineering Practice, a group which has been meeting with the Canadian Council of Professional Engineers to solve recognition problems caused by the U.S.-Canada Free Trade Agreement. A copy of the Principles of Conduct and Ethics Under NAFTA is included at the end of this workbook. It is likely that CIEP will soon begin similar discussions with other countries.

Environmental Issues: Recent events in Eastern Europe also hold ethical challenges for US professionals. As the formerly communist bloc nations seek to develop capitalistic economies and establish their own hard currencies and financial independence, there is almost certain to be an influx of US personnel and firms into the newly free nations. Most of them have industrial bases which are a shambles while they have atmospheres that make smog-shrouded Los Angeles or Denver seem almost pristine in comparison. Professionals and their firms will have to make choices between impacts on the economic environment and the atmospheric environment that will be difficult, long reaching and, maybe, long term.

Though a persuasive argument may be made that engineers as a group had strong environmental concerns long before most laymen heard of the word "ecology," it still is within the past two decades that environmental concerns have come to be regarded as an ethical responsibility of professional engineering. If we accept as correct the charge that engineers do have social as well as technical responsibilities, then those who engineer, design and operate municipal treatment plants, industrial facilities and other elements of technology that have the potential for pollution also have responsibilities for preventing the pollution.

Ian Barbour, in his book *Technology, Environment and Human Values*, comments that it has usually been assumed that science and technology are inherently good and have contributed to progress. In many cases, though, it has been the success of a technology in achieving limited goals that has created unanticipated problems. While this does not take away from the fact that new technologies have contributed to health, material welfare and higher standards of living, it does highlight the fact that these advances have sometimes had high environmental costs, costs which were unanticipated and, hence, not factored into the cost-benefit analysis. It has caused engineers and others to question the future environmental costs of new technology. Both asking and answering this question is the emerging ethical responsibility referred to in the opening paragraph. Barbour, continuing, suggests that there are three primary grounds for environmental ethics: short run human benefits from the environment, duties to future generations and duties towards non-human creatures.

Because of the breadth of concern for environmental issues and results of technology, there is emerging a concept called participatory technology in which engineers have responsibilities of informing the public as well as clients. Since many go/no go decisions wind up being political ones, then the public, in a way, is invited to participate in the use and regulation of technology. Such considerations as computers and privacy, cars and pollution, nuclear power and energy shortages, etc., require broad public input which, in turn, requires honest engineering appraisal. If it is true that prudence is foresight, caution and utility, then it is up to the technologists to provide that prudence while thinking about safety and remote results.

Technology has the potential to be a liberator, the power to be a threat and may be an instrument of power. This is why decisions about technology should include environmental and human values as well as decisions about technical feasibility and economic efficiency.

Computer Abuse: Just as the use of computers has become worldwide, so too has the opportunity for their abuse and ethical misuse become global. Neither national security information, industrial secrets nor personal privacy are safe from computer hackers or thieves whose mission may be a lark or serious business and whose geographic area of mischief may range from a neighborhood or a single company's or school's files to international intrigue.

Areas in which computer users need to pay particular attention, lest ethical violations be committed, are simulation and design. In many cases, computer simulation has begun to replace what have been regarded as essential tests or experiments. Users must be cautious that safety is not sacrificed for expediency. Equal caution must be evidenced where Computer Aided Design, Computer Aided Manufacture and other engineering computer programs are used in such a way that non-engineers are performing what have been traditional engineering tasks, sometimes with inadequate knowledge of the engineering elements involved to check and understand the output. In effect, many companies are allowing non-engineers to make engineering decisions and engineering designs without engineers' input.

Though it hardly seems necessary to mention it, many need to be reminded that computers can handle large amounts of data and make information from that data available quickly. Computers provide the opportunity to make decisions rapidly, but they do not assure the quality of those decisions.

Ethics has particular pertinence with respect to computer usage because much of a computer's effectiveness depends on its networking, and computer networks are built on reciprocal trust. With computers, as elsewhere in engineering, ethics, trust and professionalism are terms which are interdependent and cannot be separated.

Responsibilities to Society, Clients, Employers and the Profession

The professional has a wide range of responsibilities in four primary areas:

1. to society,
2. To clients,
3. to employers, and
4. to his/her profession and fellow professionals.

It follows that the profession also has responsibilities to the professional.

In today's technological society, the engineer's responsibility for the overall well-being of our society is as great as that of any citizen or professional person. Engineers who do not think about the philosophical problem of what is best for mankind may be the means of destroying humanity rather than of bettering it. Since perhaps 90-95 percent of all engineers are employed rather than in private practice, it follows that many of them work in profit making enterprises. While private profit does not necessarily conflict with public interest, public and private objectives do not completely coincide. Business, partly because of engineer

input, is beginning to realize that it has a social responsibility in addition to its goals of making profits and perpetuating itself. In that vein of discussion, Adolph Ackerman, quoted in *Ethical Problems In Engineering*, writes that ethics become the dominating influence on the truly professional engineer and that knowing more than the general public does about the effect his work will have, his first duty is to serve the public interest above all others no matter what his employer may want or some government regulation may permit.

Carrying along that same reasoning, Victor Paschki writes: "A cause and effect relationship exists between an engineering action and human beings. Every person recognizes his responsibility for his actions in general and there is no good reason to exempt from this responsibility the main content of one's life that is one's professional work." While Paschki values forums where engineers may explore ideas of values and ethics and social consequences, he concludes that the final consequences must be with the individual.

Mantell, in his book *Ethics and Professionalism in Engineering*, says that the truly great contribution of engineering and its methodology to society is its willingness and ability, in spite of much that is not known about materials and forces of nature, to perform needed services within a time limit and with whatever financial resources are available. The right answer for society, according to Mantell, may not always be the best possible answer to the problem because of these constraints.

Though none question the engineer's responsibility to society, codes are somewhat less than clear in this area. The code words, "public health and safety," are less inclusive than "the welfare of humanity at large" which is a much wider concern than the immediate public health and safety. The welfare of humanity involves fundamental moral principles and long-term consequences of present engineering actions. As important as the ability to render technically competent services is the obligation to make for society a better place to live.

Unless they maintain an ethical attitude of unbending integrity which results in placing public interest above all else, there is the risk that engineers will be regarded not as professionals, but as mere technicians. This is because professional status carries with it an implied contract to serve society beyond all other obligations in return for the protection and status that society grants to the profession. Still, those who argue that the engineer should assume even more responsibility have an obligation to push, also, for a means of protecting those professionals who suffer financial or career setbacks as a result of meeting their ethical responsibilities.

As a part of his responsibility to clients and employers, because technology is ever changing, the professional engineer must be ever learning. When they graduate, engineers have been given the best education that can be crammed into their time of attendance at school. Unfortunately, some have not developed an appreciation of the need for continuing education, either formal or informal. They have a clear obligation not to let this scientific training fall into arrears. Other professionals, such as doctors and lawyers, find in their daily work situations which require them to continue to learn and study. The practicing engineer may encounter such situations less frequently, but it is no less a requirement. Increasingly, state registration boards are imposing continuing

education requirements. This will call attention to the problem but only partially solve it. Many engineers are not required to register, so board actions do not impact them, yet their ethical obligations are undiminished by the fact that they are exempted from a registration requirement.

Grist for the thought mill is contained in the "Ten Commandments of Engineering Professionalism" penned by R. Harvey in 1988 as part of an article titled "Professionalism and the Civil Engineer," published in *Journal Of Professional Issues In Engineering*, Vol. 115, #4 and listed again here:

1. Thou shall think professionally, act professionally, and demand the same from those around you.
2. Thou shall not be manipulated by those around you.
3. Thou shall not expect perfection from your fellow engineers.
4. Thou shall not become entrenched in your ways.
5. Thou shall be receptive to new ideas and innovative approaches to old problems.
6. Thou shall become active in your community and make yourself known to the press and to your local and regional politicians.
7. Thou shall not engage in intra-professional cutthroat competition.
8. Thou shall select engineers based on expertise and not on price.
9. Thou shall not bid engineering work.
10. Thou shall seek just compensation for engineering services.

Just as engineers have responsibilities to their profession, so too does the profession have responsibilities to its members. Recently in a seminar conducted at a state wide Society of Professional Engineers meeting by the developers of this course, participants were asked to respond "yes" or "no" to a dozen questions about engineering ethics. The imprecise nature of the subject was such that on 11 of the 12 questions, there was nothing approaching complete agreement as to the answer. The one question on which there was almost total agreement was: "Do you feel that professional societies generally do a satisfactory job of protecting members who make great personal sacrifice in the face of ethical dilemmas?" The near unanimous answer was "No." Clearly, for this perception to change, societies will have to do more than grant some award or recognition to an engineer after a job has been lost and savings decimated by legal defense costs.

Membership in professional societies as a sign of professionalism on the part of individual engineers is an accepted concept. Until the societies are able to do more to protect the rights of their most ethical and dedicated members, the road will be perceived as a one-way street, and many will not join who could profit by and contribute through such membership.

- ASCE Ethics -
Edict, Enforcement and Education

by
Thomas W. Smith, III, Esq., M.ASCE[5]

The American Society of Civil Engineers ("ASCE" or the "Society") continuously strives to build a better quality of life for its membership, the engineering profession, and society at large. Implicit in every Society undertaking is the paramount importance of maintaining the highest standards of ethical conduct. Like other professional societies, an important means by which ASCE promotes high ethical standards is by maintaining and enforcing a Code of Ethics, and educating engineers and the public on ethics issues.

Edict: Who Needs A Code Of Ethics?

Everyone has their own personal code of ethics, developed through education and experience. With the basic fundamentals identified in kindergarten and even earlier, we have each developed personal ethical codes, with input and guidance from numerous people, including family members, friends, teachers, mentors, co-workers, community and church leaders, coaches and role models. Recognizing the personal element of ethics, and expressly noting that ethics is a matter of an engineer's individual responsibility and honor, ASCE's Board of Direction resolved in the late 1800's not to adopt a code of ethics, explaining" that it is inexpedient for the Society to instruct its members as to their duties in private professional matters." So why do engineers need a professional code of ethics?

Ethical codes vary among individuals and also among corporations, governments and professions. History is filled with examples of the impact on society of varied ethical codes. From the corporate perspective, one can hardly pick up the newspaper anymore without reading about another corporate scandal. Through a long list of companies that most Americans can readily recite, including Enron, Arthur Andersen, Tyco, Worldcom and Health South, we have learned that ethical standards have a profound impact on corporate America. As Allen Greenspan noted testifying before Congress in 2002, "trust and reputation can vanish overnight," and we have seen repeated examples of such occurrences, demonstrating why good ethics is good business. Recognizing the importance of sound corporate ethics and governance, Congress adopted the Sarbanes-Oxley legislation in July 2002 in an effort to restore public confidence in corporate America with a legislated code of fiscal ethical responsibility. But Congress does not legislate every facet of corporate ethics.

Sound ethics is critical to the success of local, state and federal governments as well as to corporations,. Few people would have difficulty naming local and national government leaders whose power and credibility have been diminished or eradicated due to unethical conduct. Ethics issues can impede development and advance poverty in small communities and countries alike, examples of which include Bangladesh and Nigeria, which rank at the bottom of Transparency

[5] Managing Director, Corporate and General Counsel, American Society of Civil engineers

International's Corruption Perception Index list (http://www.transparency.org/). With new infrastructure construction likely to occur largely in developing countries, many with widely varying ethical standards, government ethics on a global scale remains a paramount concern.

Ethics also impacts professions. Many of the recent corporate scandals referenced above adversely impacted the credibility and public perception of the accounting profession. The legal profession has likewise suffered a longstanding struggle with credibility and public perception problems, and lawyer jokes remain a common favorite at most any gathering, ranging from parties to business meetings. While it is difficult to quantify the impacts of such public sentiment, I would note that the Virginia State Bar spends significant resources processing over 3,000 professional conduct complaints each year regarding Virginia's approximately 23,000 licensed attorneys. While many of these claims are proven to be unfounded, it causes one to wonder if the filing of unfounded claims is influenced by general public perception regarding the ethical standards and credibility of attorneys.

History demonstrates that trust, reputation and credibility remain important to the success of individuals, corporations, governments and professions. The engineering profession is no exception. Engineers are entrusted with the highest level of responsibility – protecting the public health, safety and welfare. Recognizing this responsibility, ASCE's Board of Direction defined the profession as a "calling in which special knowledge and skill are used in a distinctly intellectual plane in the service of humanity [in which] there is implied the application of the highest standards of excellence. . . in the ethical conduct of its members." Describing the engineering profession, President Herbert Hoover noted:

> *It is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realization in stone or metal or energy. Then it brings jobs and homes to men. Then it elevates the standards of living and adds to the comforts of life. That is the engineer's high privilege.*

With the engineers' high privilege comes a concomitant high responsibility – protecting the public health, safety and welfare. Entrusted with the highest level of responsibility, the engineers' credibility, trust, reputation, and high ethical standards remain paramount. But do engineers need a professional code of ethics?

I believe the answer is a resounding "yes." While surveys have shown that engineers enjoy a high level of trust among the public, the engineering profession has suffered from ethics breakdowns, notable examples of which include the Challenger space shuttle disaster, the Hyatt Regency walkway collapse, and the improprieties leading to the resignation of Spiro Agnew from the Vice Presidency of the United States. Engineers today work in a competitive business environment. Competition is global and sophisticated. Engineers are consistently pressured to reduce costs and increase productivity, to do more with less resources. Engineers must be well-rounded, with management expertise and familiarity with complex project requirements, responsibilities and risks. Sophisticated contracts, laws and regulations, and complex litigation a

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commonplace, and successful practice requires that engineers participate in these arenas. Engineers confront environmental and sustainable development concerns, tasked with ensuring that future generations can meet their needs. The electronic age and infrastructure security present new challenges and responsibilities. As a consequence, a written professional Code of Ethics proves a useful tool to assist the engineer in the frequently complex ethical decision-making process.

ASCE's Code of Ethics was adopted in 1914. Despite earlier concerns and delays, the Code of Ethics was approved by letter ballot of the membership. Although a significant first step, the original ASCE Code of Ethics contained six principles and addressed business issues, as opposed to addressing the personal professional ethics of the membership. The Society's Code of Ethics has been amended numerous times over the years, most notably to delete a provision which made it unethical "to invite or submit priced proposals under conditions that constitute price competition for professional services." This provision came under Department of Justice antitrust scrutiny in the 1970's. A subsequent Department of Justice investigation in 1992 led to voluntary revisions to the Code to eliminate language which prohibited "self-laudatory" advertising and to clarify prohibitions on unlawful consideration and contingency fees. In 1996, the Society amended the Code to incorporate the principles of sustainable development.

To address concerns regarding disparate international ethical standards, ASCE's Board of Direction voted in 1963 to add the following footnote to the Code of Ethics:

> On foreign engineering work, for which only United States engineering firms are to be considered, a member shall order his practice in accordance with the ASCE Code of Ethics. On other engineering works in a foreign country he may adapt his conduct according to the professional standards and customs of that country, but shall adhere as closely as practicable to the principles of this Code.

William Wisely wrote that this was a controversial footnote, described as the "When in Rome Clause." The footnote was no longer included in the Code of Ethics starting in 1977, which was the year Congress passed the Foreign Corrupt Practices Act to prohibit bribery of foreign officials by American corporations. The topic of global ethics remains of paramount concern today, and ASCE created this year a Task Committee on Global Standards of Professional Practice to work with engineering societies around the world to develop a standard of practice for engineers that will define their professional behavior in securing and performing engineering assignments.

ASCE's Code of Ethics remains an evolving document, benefiting from the input and experience of thousands of engineers over almost ninety years. While many ethics issues are gray and not black and white, the Code of Ethics provides a foundation for the engineer's ethical analysis and decision-making process. Likewise, discussing ethics issues with one's peers, calling ASCE's ethics hotline at 703-295-6061, and analyzing decisions under the assumption of public review and scrutiny, provide a good basis for sound ethical decision-making. While the Code of Ethics does not provide all the answers, it remains an effective

foundation for ethical analysis and an important means by which ASCE advances the engineering profession.

Enforcement: How Can ASCE Promote Compliance?

The Code of Ethics is not a stagnant document. To preserve the high ethical standards of the civil engineering profession, ASCE maintains and enforces its Code of Ethics. All Society members must subscribe to the Society's Code of Ethics, and it is the duty of every Society member to report promptly to ASCE's Committee on Professional Conduct ("CPC") any observed violation of the Code. Charges of unethical conduct may be brought by Society members and non-members and are referred to the CPC for investigation.

Established in 1923, CPC is charged with investigating charges of member misconduct. CPC comprises at least four past members of ASCE's Board of Direction. During the investigation phase, CPC acts like a grand jury. If CPC finds sufficient evidence to warrant disciplinary action, the case is scheduled for hearing before ASCE's Executive Committee. In conducting professional conduct investigations, CPC may solicit assistance from local Society members or Sections.

The Executive Committee considers proceedings for the discipline of a Society member upon the (a) recommendation of CPC, or (b) written request of ten or more Society members. Hearings are conducted in accordance with written procedures for professional conduct cases. Due Process is afforded to the member, including reasonable notice of the charges and the hearing, fair opportunity to hear the evidence, question witnesses and refute the evidence, and a hearing before an unbiased panel. The Executive Committee acts as a Judge or Jury. At this point, a CPC member serves a function similar to a prosecutor.

Upon finding a violation of the Code, the Executive Committee may take disciplinary action, other than expulsion, by a majority vote. Such action typically includes a letter of admonition or a suspension from membership. The most severe penalty is expulsion from the Society. The Executive Committee cannot expel a member, but can make a recommendation to the Board of Direction that the member be expelled. If the Executive Committee votes to recommend expulsion, the case is scheduled for hearing before the Board of Direction, with the same due process protections afforded at the Executive Committee hearing. A decision to expel the member requires a seventy-five percent vote of the Board. The Board may impose lesser disciplinary actions upon a majority vote. The Executive Committee and Board of Direction have discretionary authority to publish the action, with or without the name of the member. Such notice is typically published in *ASCE News*. The Executive Committee and Board of Direction also have discretionary authority to notify other professional organizations or registration boards of the action.

ASCE enforces the provisions of its Code of Ethics to preserve the high ethical standards of the Society and the profession. While taking care to ensure that such enforcement is not anticompetitive and that due process is afforded, with reasonable notice and a fair hearing, ASCE endeavors to advance the profession and the public interest by the fair enforcement of reasonable ethical practices.

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Education: An Ounce of Prevention is Worth a Pound of Cure

As referenced above, the Code of Ethics is not a stagnant document, and all engineers should continue to familiarize themselves with the Code of Ethics and related responsibilities under applicable laws and licensing regulations. Recognizing the complexity of civil engineering projects and practice, and the critical responsibilities and wide-ranging considerations that civil engineers confront, ASCE's Board of Direction voted in 2001 to adopt Policy Statement 465, which "supports the concept of the master's degree or equivalent as a prerequisite for licensure and the practice of civil engineering at the professional level." Last year (2003), ASCE defined the Body of Knowledge (BOK) needed to enter the practice of engineering at the professional level to include "an understanding of professional and ethical responsibility." From personal experience, I can attest that civil engineering students appreciate and actively participate in ethics education and discussions, and such education and training is important both during the formal education process and throughout an engineer's professional career.

ASCE endeavors to educate engineers on ethics issues. The Society has case studies to provide guidance on ethical problems. The Society sponsors ethics seminars, and has adopted multiple policies on ethics issues, including Policy Statement Number 376 encouraging state boards of engineering registration to institute take-home examinations on professional ethics for professional registration; Policy Statement Number 130 supporting the establishment of rules of professional conduct for engineers and land surveyors consistent with the Society's Code of Ethics to guide licensees in their practice; Policy Statement Number 418 supporting implementation strategies to promote sustainable development; and Policy Statement Number 502, adopted in July 2003 to confirm the importance of the engineer's independence and duty to avoid conflicts of interest.

The Society makes available ethics videos, including a video tape of a mock Board of Direction hearing, the video and workbook entitled "*Testing Water...and Ethics*", and the National Institute for Engineering Ethics' video entitled "*Incident at Morales*." The Society publishes the Code of Ethics on the Society's web site and in the Official Register, and the Society has published Standards of Professional Conduct for Civil Engineers and Guidance for Civil Engineering Students. The Society also publishes papers on engineering ethics, including numerous articles in the Journal of Professional Issues in Engineering Education and Practice. The Society promotes the Order of the Engineer program and ring ceremonies, which focus attention on the obligation of the engineer to protect the public health, safety and welfare, and which help to "foster a spirit of pride and responsibility in the engineering profession, to bridge the gap between training and experience, and to present to the public a visible symbol identifying the engineer." The Society also awards annually the Daniel W. Mead prize for younger members and students on the basis of papers on professional ethics.

Recognizing the increasing complexity of the profession and the profound importance of engineering ethics, ethics education remains an important means by which ASCE and other professional societies can increase awareness of ethics issues, advance the science and profession of engineering to enhance the

welfare of humanity, and enable engineers to be global leaders building a better quality of life.

Conclusion

Engineering ethics involves complex issues that are global in scale and critical to the Society, the profession and to the public at large. I believe engineers enjoy a positive public image, with a reputation for providing public value by honest and ethical means. By adopting and enforcing a Code of Ethics, and continuously educating engineers on the complex and evolving field of engineering ethics, ASCE and other professional societies can continue to advance the profession and improve the quality of life worldwide.

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