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VOLUME 76, NUMBER 2

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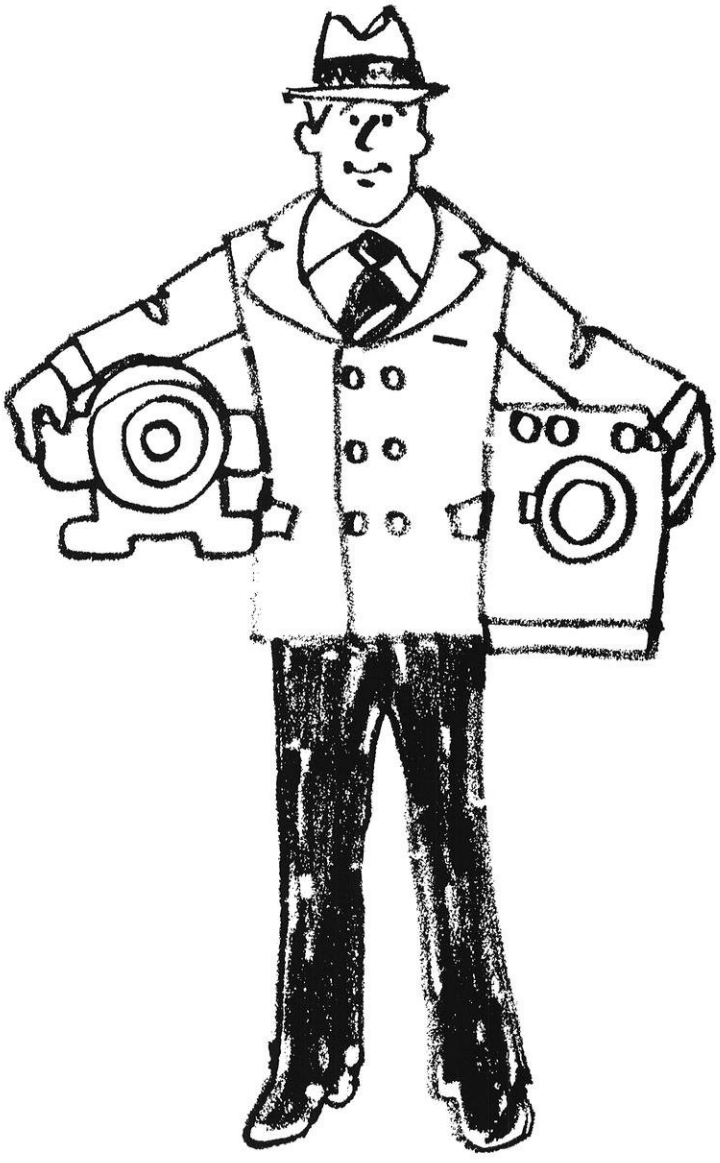

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CONTENTS:


**The Concept of a Professional Society** ..... 2
by Jim Guenther

**The Trans-Alaskan Pipeline** ..... 4
by Mike McCombie

**Reverse Osmosis** ..... 8
by John Krumpos

**Campus Comments** ..... 13

**Gymkhana** ..... 14

**Static** ..... 16


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# THE CONCEPT OF A PROFESSIONAL SOCIETY

by James Guenther
ChE-4

Should you be a member of a professional society? The answer to that question must be a resounding yes, unless you are content to be merely a time-server. The world of technology is continually growing and changing; and the best way to follow these advances is to continue your own education through active involvement in your professional society.

Today's engineer is a professional; in the same catagory as a doctor or a lawyer. Along with the advantages of a profession must go the responsibility to use the talents in good faith. The concept of a professional society was founded on this precept. The objectives of the AIChE point this out very well:

*"To advance chemical engineering in theory and practice to maintain a high professional standard among its members, to serve society, especially where chemical engineering can contribute to the public interest."*

And now, in the days where the distinction between blue collar workers and the professionals is becoming less and less clear, a fourth purpose should be added – to aid its members in finding satisfactory working conditions and adequate compensation for their endeavors.

The first of these objectives is a far reaching statement, and well administered by our engineering societies. It is promoted through many channels including: research journals and publications; national and regional conferences, where technical papers are presented and later published; committees set up to investigate problems currently of interest to the engineer; and finally, in an indirect way, by offering awards for major contributions to the profession.

The second objective is one that requires a great deal of personal involvement on the part of its members. Professional societies take great pride in keeping abreast of current trends in engineering. Their publications are again the main vehicle to convey information to the membership. Service on committees is also important for the individual, as is the personal contact gained at the conferences. Here, personal contact means more than getting together for a drink between meetings or going out on the town for the evening; it means having meaningful discussions of problems and exchanging ideas. For students, it means talking with fellow students, faculty, and practicing engineers. In either case, the learning experience accessible through society activities can be invaluable to an individual's professional career.

The third function of a professional society is to serve the public. In this respect engineering organizations have been especially useful. For example: when nuclear reactors were still in their infancy, ASME worked closely with the Atomic Energy Commission to develop standards and codes for nuclear reactor components. A second example is the unselfish expenditure of large amounts of time and money by the ACS to produce the document "Cleaning Our Society: The Chemical Basis for Action." These examples help to demonstrate the great care taken by professional societies to protect the public interest from abuses of technical sophistication.

The fourth function of these organizations is a self-protection mechanism. Unions today are pushing the working mans wages and benefits upward at a rate which may soon overtake the professionals'. To prevent this from occurring, professional societies are becoming more tangibly involved in labor-management relations. They realize that the idea of a professional person, with all of the required training and responsibility, can exist only where the benefits and salary are commensurate with the work.

These programs provide an excellent opportunity to help you become a better professional. A good way to get started is through participation in a student chapter, and there is no time like the present.

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# THE TRANS-ALASKAN PIPE LINE:
## A Financial Dream or

by
**Mike McCombie M&ME-4**

Today Alaskans are waiting impatiently for their new "black gold" to flow across their state and bring economic improvement to a forgotten land. The technical problems involved are as great as the mountain ranges and land faults that crisscross the 3.5 billion dollar pipeline route. The permafrost (permanentally frozen ground) makes up 85% of the Alaskan terrain over which the line will have to run. These problems in combination, make the pipeline seem like a "pipe dream."

T.A.P.S. (Trans-Alaskan Pipeline System) has tried desperately to solve the permafrost problem, but in initial reports over 90% of the pipe was to be buried. However, in more recent reports the buried pipe has gone down to 52%. This is a significant fact when it is realized that oil will flow in the pipe at a temperature of 176 degrees F. As Dr. Arthur P. Lachenbruch of the U.S. Geological Survey's Menlo Park research staff noted in a permafrost-heated pipeline article, "a pipeline 48 inches in diameter, buried six feet in permafrost and heated to 176 degrees F. would thaw a cylindrical region around the line 20 to 30 feet in diameter in a few years in a typical permafrost soil."[1] He went on to say, "The principal effect of insulating the pipe would be to increase oil temperatures rather than to decrease thawing."[2] It can now, however, be assumed that the insulated buried pipe will not thaw a cylindrical region of the size previously mentioned. However, the consequences of a small crack in the insulation should be considered.

Geological Survey

**Building, south of Fairbanks, Alaska on Richardson Highway, subsiding because of thawing permafrost.**

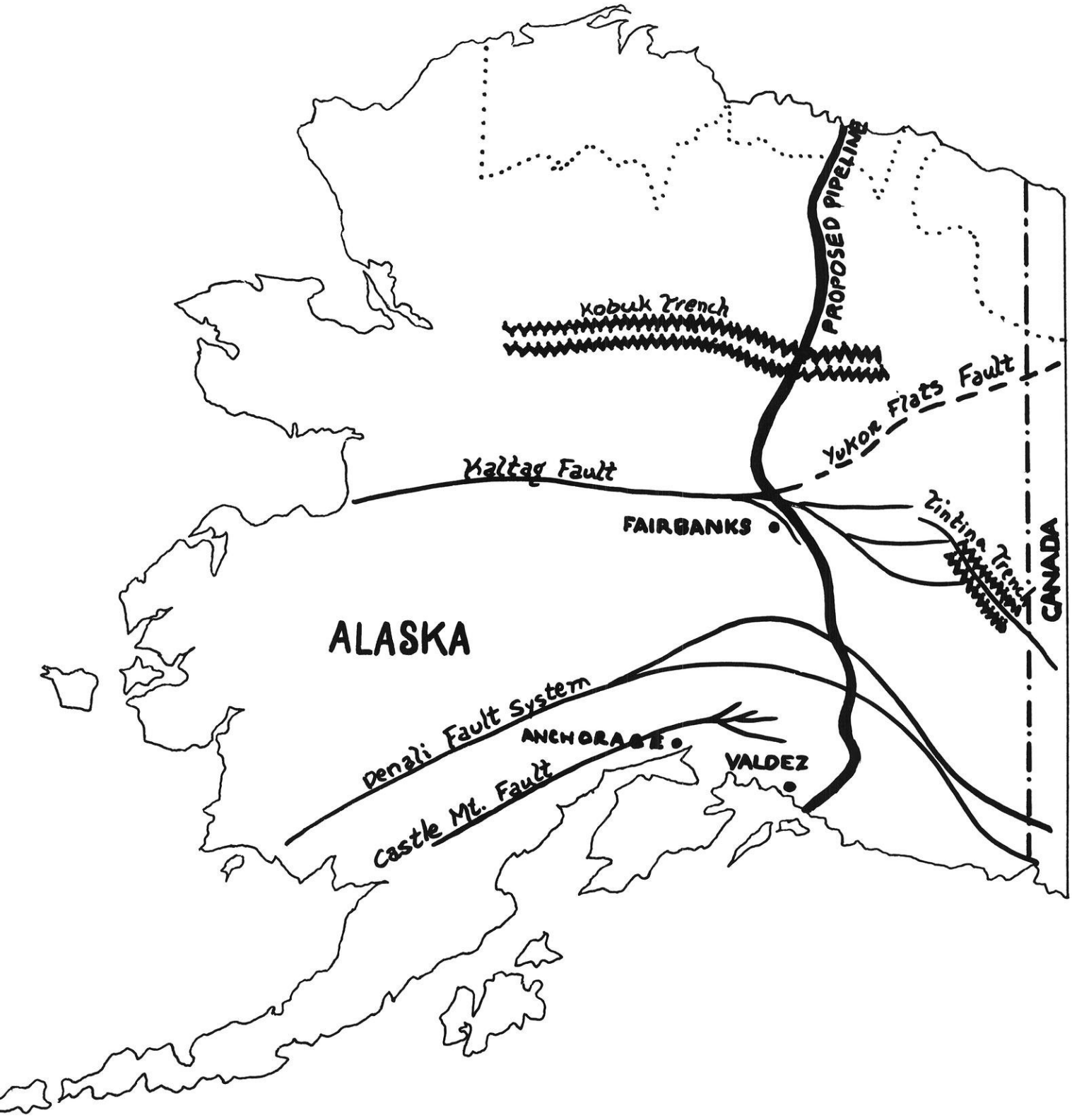
Another area of major concern is earthquake design because the pipeline through several fault regions. Cutoff valves will be part of the system design. Because the pipe is 800 miles long and each mile contains 500,000 gallons of oil, any break could be disastrous. Precautions include engineering the pipe for a specific size, but we can't predict with certainty that an earthquake of a greater size will not occur. It should be pointed out that a spill caused by a break in one section could be strictly local due to hilly conditions. Also, that the oil companies have put together quite an impressive array of equipment to clean oil spills. However, Dr. Harry Coultier, one of the Geological Survey's principal technical advisers, says, "Our chief intent is to prevent spills; not to provide systems for clean up."[3]

The technical problems arising are many, but if this pipeline becomes a reality, it is felt it may be the best engineered pipeline so far. Yet it is almost impossible to find a typical pipeline system that has been engineered and safeguarded so completely that failure hasn't occurred.

Disaster can come in many forms, and not all people are worried just about spills. Others are concerned how this pipeline will affect the ecological balance of the delicate Arctic. The proposed pipeline will have an adjacent service road. Not an obvious, but a dangerous threat develops with every road that wanders through previously untouched land. As John W. Thomson, Professor of Botany at the University of Wisconsin, said;

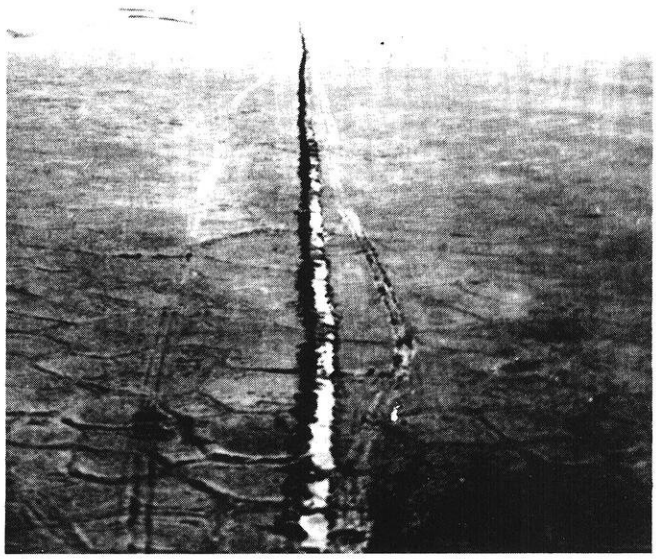
*"There seems no realization that the dust from the highway can pollute the air for some distance from that highway. Such pollution effects extending into the vegetation a considerable distance from the Alcon Highway to Alaska were obvious to the writer, altering the composition of the plant, particularly the epiphytes. The twelve pumping stations would be discharging hydrocarbons fractions and also silver compounds which are exceedingly effective in destruction of lichen vegetation. In the tundra, lichens may constitute over 50% of the vegetational cover. It may be reminded that these lichens are the main winter food sources of caribou."*[4]

# An Environmental Disaster?



into account the tremendous distances that would be devastated by fires in this part of the world since fire-checks are so far apart. Because of the short growth periods in Alaska, a forest would take 80 to 200 years to reach pulpwood size, and thus, recovering from such destruction may be measured in centuries. The consequential losses must be considered by the public.

There are also several men who are taking a different look at this pipe. Among these is Frank J. Worzala, associate professor of Metallurgical and Nuclear Engineering, who has raised several questions about sound design and inspection of this pipeline. The primary questions of ductility and welding procedure still remain unanswered. Basically, the ductility problem arises when there is pipe shutdown and the above ground pipe reaches an outside temperature as low as -20 degrees F. When this happens, and if the metal becomes extremely brittle, any small crack could cause the pipe to break at the speed of sound. This problem of longitudinal cracking has reasonably been irradicated by the steel manufactures due to better than specified longitudinal ductility. However, the transverse ductility is still questionable. This means the pipe still could crack circumferencially. The weld areas could also fail because of the allowable defects and the lack of specified welding procedure. It is interesting to note that an allowable defect of two inches is possible in the weld, and radiographic inspection will only cover 10% of all welds. Even though T.A.P.S. has already done much research in the procedure of welding under Arctic conditions, it has not given out a list of procedures on how independent welding companies should weld.



**Tractor trail near Canning River, Alaska. Polygonal ice-wedge pattern and small ponds in road resulting from thawing permafrost.** Geological Survey

These points may seen small compared to the fantastic problems that will be met when the pipeline is laid over a mountain or across a northern flowing river that every spring changes its course due to ice jamming. But Mr. Worzala and many people like him feel that these problems should be considered.

I should say there is nothing the oil companies can do about the pipe ductility because the pipe is already made. What can be done, however, is to run the pipe at a figure far less than capacity, say 70%, so they can better assure the public of safe operation. The most important part of the design of this pipe must be that T.A.P.S. has done the maximum to build in safe guards and not the minimum.

The 5 to 10 billion tons of oil in northern Alaska remains a dream to come true for the nine oil companies of T.A.P.S. The questions remaining of mountains, earthquakes, permafrost, design, ecological balance, ductility, and weld specifications tend to make us wonder if this pipeline will become a nightmare come true for Alaska and it's environment.

Geological Survey

**"Roller-Coaster" railroad near Strelne, Alaska caused by differential subsidence stemming from thawing permafrost.**


1. Lachenbruch, Arther H., "Some Estimates of the Thermal Effects of a Heated Pipeline in Permafrost," U. S. Geological Survey.
2. IBID.
3. "Interim Comment on Taps Submittals of Feb. 20, 1970," Menlo Park Wroking Group Memorandum.
4. Thomson, John W., "Response to Environmental Impact Statement on the Trans-Alaska Pipeline," p. 2-3.
5. Moxness, Ron, "The Long Pipe," Maxwell Reprint Co., March 1971, p. 14-21.
6. Worzala, F. J., "The Trans-Alaska Pipeline, Nature's Test of Engineering Genius," paper presented at the Chicago Section, Am. Inst. of Metallurgical Engineers, Oct. 6, 1971.

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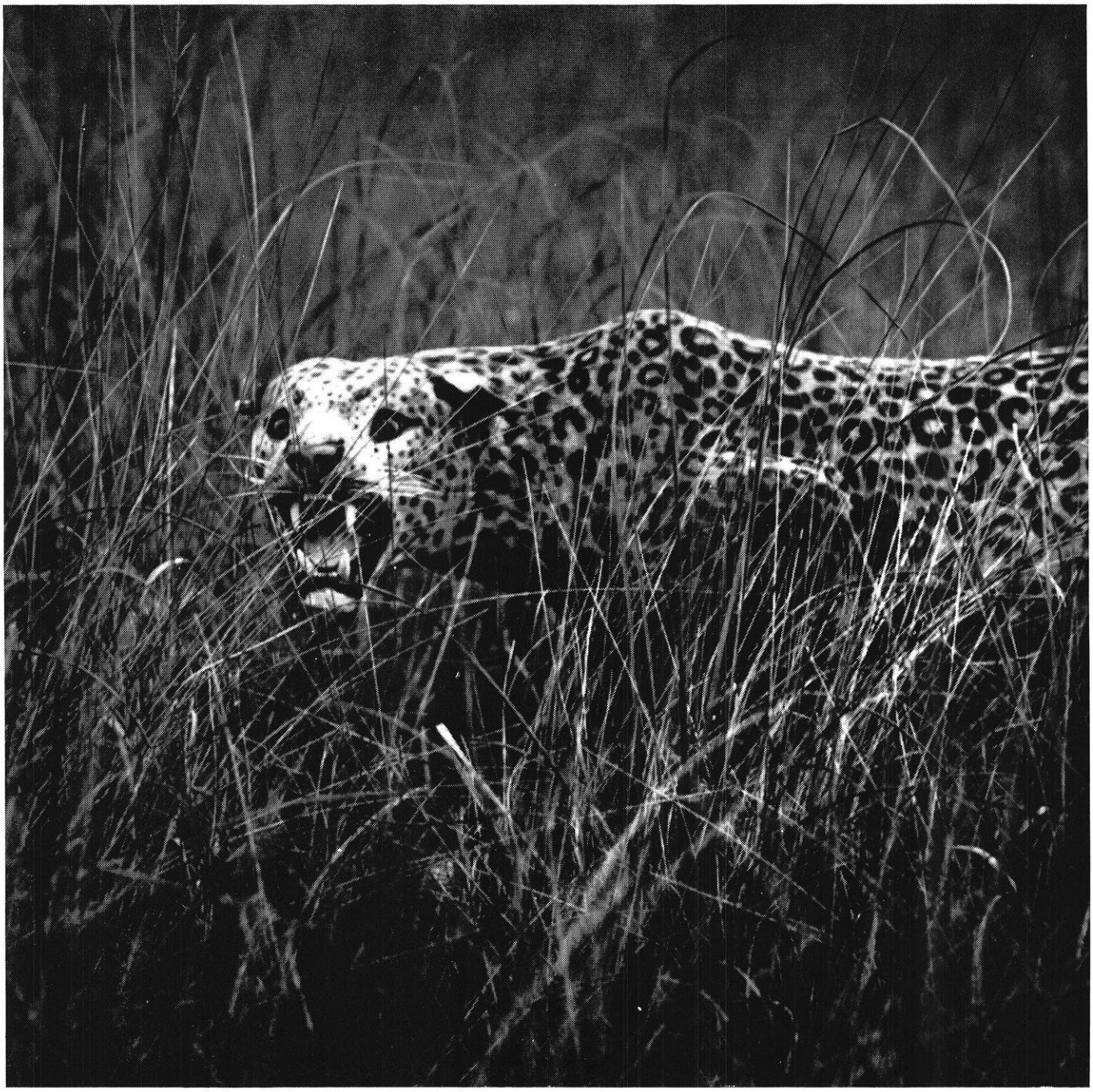

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# Reverse Osmosis

by

John Krumpos ChE-4

Today's concern with the environment has led to, among other things, a demand for water pollution abatement. Consequently, new methods are being developed to remove not only the particulate material, but also dissolved compounds, such as phosphates and nitrogen compounds, and toxic trace elements, such as mercury and cadmium, from municipal sewage and industrial effluent. One method being developed utilizes reverse osmosis to affect this separation. To demonstrate the applicability of reverse osmosis to this problem the following experiment was conducted.

A cellulose acetate membrane (Amicon Diaflo model UM2) was used with a high pressure cell (Amicon model 420B) to affect the separation of the solvent from aqueous solutions of 5% urea, 1% ovaloumin, and 5% urea – 1% ovaloumin. The cell consisted of a cylinder, capped at one end, with valves for pressurizing and de-pressurizing the cell; and closed at the other end by a porous, stainless steel disc which provided support for the membrane. The disc was held in position by a second cap which also served to collect the product (see – Fig. I). The membrane consisted of a film (approx. = 0.5 mil) of cellulose acetate deposited on filter quality paper. The manufacter's specifications claimed that the membrane was capable of retaining, to varying degrees, molecules with molecular weights greater than 1000, and in particular, was capable of retaining 99.9+% ovalbumin. The separations were carried out batchwise by admitting a solution sample into the magnetically stirred cell, and pressurizing the cell. The solvent, water, passed through the membrane and out the discharge port, where it was collected. The cummulative volume of product was measured with respect to time and taken as the rate of separation. Samples of the product were analyzed to determine the amount of solute remaining; urea concentrations were determined from density measurements and the much smaller concentrations of ovalbumin were determined with the aid of u.v. spectroscopy.

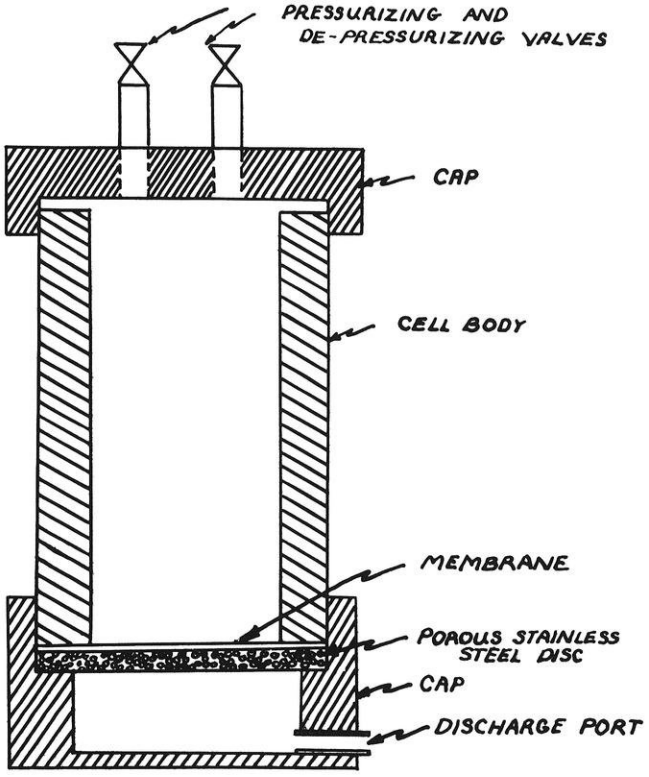


**Fig. I – Reverse Osmosis Cell**

At a pressure of 80 psig it was found that none of the solute in the 5% urea solution was retained, that is, the concentration of urea in the product was the same as the initial concentration, which was to be expected since the molecular weight of urea is only 44. On the otherhand, 99.9+% of the solute in a 1% ovalbumin solution was retained by the membrane, in keeping with the manufacturer's claim. A not totally expected result was observed though in the separation of the 5% urea – 1% ovalbumin solution. As before, 99.9+% of the ovalbumin was retained, but in addition almost 60% of the urea was also retained. Finally it was observed that the product rate decreased with time and appeared to approach a limiting value (see – Fig. II). To appreciate these results it is necessary to understand some of the theory involved.

The term reverse osmosis is applied to the phenomenum of the migration of molecules through a selective membrane from a region where they are in low concentration to a region where they are in higher concentration. Although this is contrary to the natural tendency of a system to go from an ordered state to a less ordered state, it is predicted by thermodynamics under certain conditions.

The second law of thermodynamics states that a system procedes naturally from a state of order to a state of disorder. Applied to this system, the second law states that the net flow of those molecules, i, which can pass through the membrane will be in the direction that produces a decrease in order; ie, from the side where i is in higher concentration to the side where i is in lower concentration. In an open, isothermal system, this net flow will continue unti the $\Delta G$ of the system is zero (see table I).

1. $\Delta G = (\Sigma n_j \mu_j)_2 - (\Sigma n_j \mu_j)_1$

where $n_j$ = no. of moles of j

2. $\Delta G = \int_1^2 s\,\partial T + V(P_2 - P_1) + \int_1^2 \mu_j\,\partial n_j$

where s = entropy
T = absolute temperature
V = volume
P = pressure

3. $V(P_2 - P_1) = \int_1^2 \Sigma \mu_j \partial n_j$

**Table I.**

In a binary mixture, this means that the flow will continue until the sum of the products of $n_j$ and $\mu_j$ on side 1 is equal to that on side 2, or, in other words, until the concentrations are equal. In a closed, isothermal system of constant volume, this net flow causes an increase in the number of molecules on one side of the membrane, which increases the pressure on that side. Again the flow will continue until $\Delta G$ is zero, but since the process is no longer isobaric, $\Delta G$ must be defined as in Table I.

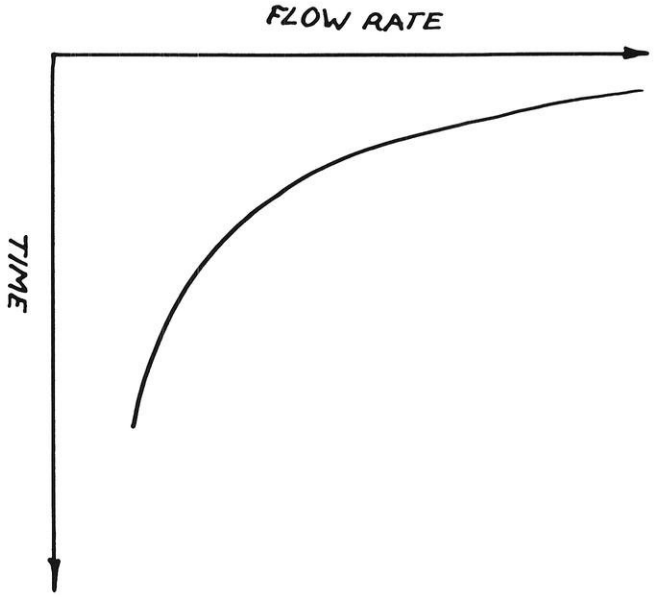


**Fig. 2 – Product flow rate vs. time**

Simply, equation 3 states that the net flow will continue until a certain pressure, $P_2$, known as the osmotic pressure, is developed on side 2. At this point the net flow will drop to zero and the concentrations on either side of the membrane will remain constant. Should the pressure on side 2 be increased by external means, the system will be thrown out of equilibrium. The net flow of i molecules will then be in the reverse direction until the pressure on side 2 has been reduced to a new value corresponding to the osmotic pressure for the new concentration difference. This is reverse osmosis. Thermodynamics says nothing though about the membrane, except that it must be selectively permeable.

Two concepts, or models, of membranes are generally expounded today. One states that those molecules to which the membrane is permeable, dissolve into the membrane and diffuse through it as a solute in a solution in the direction of decreasing chemical potential. The other model pictures the membrane as a filter with pores large enough to allow one species of molecule to pass through, but too small for the other species. In addition, Sourirajan (1) has postulated that the membrane surface is phobic to the retained molecules. Explaining in terms of the 1% ovalbumin solution, this would mean that next to the surface of the membrane there would be a layer of pure water, the thickness of which would be a function of the dielectric constant of water and the nature

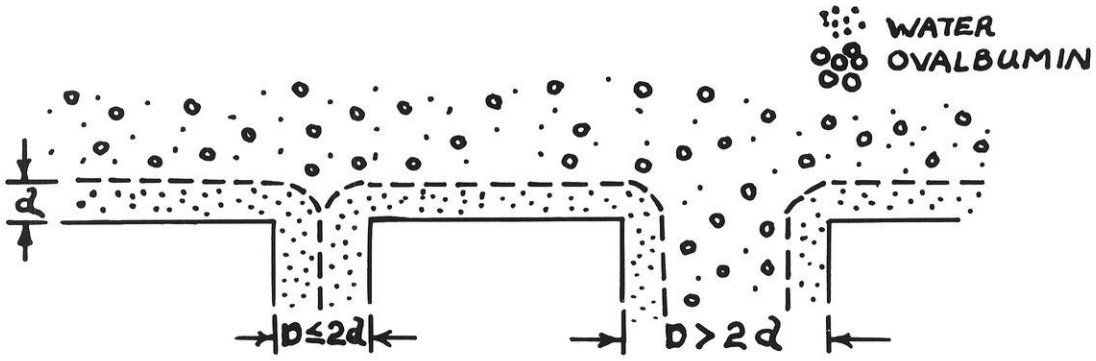


**Fig. 3 – Membrane Model – S. Sourirajan**

and strength of the repulsion. He continued by saying that a membrane that does retain one species of molecules in a solution has pore diameters that are smaller than twice this thickness. Fig III demonstrates the significance of this statement. Both concepts are attractive and are applicable to a great many cases. Here it is thought that the pore concept was most likely because of the failure of the membrane to retain any small molecules. In addition, the flow rates experienced (about ½ ml/min-/cm$^2$) seemed high for the disolution of the water into, and the diffusion through the membrane at a pressure of only 80 psig.

Returning to the experimental results, the fact that ovalbumin was retained while urea alone was not can easily be explained if it is assumed that the membrane corresponded to the pore model. In this case the shear size difference between urea and ovalbumin is the obvious reason; urea being small enough while ovalbumin being too large to pass through the pores. In addition, Sourirajan's membrane model also predicts these results when it is noted that urea, like water, is a polar molecule and could be expected to interact similarly. Next, the explanation of the retention of the urea in the urea – ovalbumin solution can be made without reference to a membrane model by noting that urea is a good solvent for proteins, such as ovalbumin. The consequence of this can be pictured as a shell of solvating urea molecules surrounding the ovalbumin molecule which is retained along with this molecule. It can also be thought of as a lowering of the chemical potential of those urea molecules interacting with the ovalbumin molecules so that there are fewer urea molecules with sufficient chemical potentials to migrate at the given pressure. Finally, the decrease in the product rate with time was the direct consequence of the flow of water through the membrane leaving the solute molecules piling up at the membrane surface which is analogous to the polarization of an electrode. This high concentration of solute decreased the chemical potential of the water at the interface, which decreased the driving force across the membrane. Carried to the extreme, the concentration of solute would become so large that the flow of water would cease. It is known though that molecules of one substance will diffuse through another substance in the direction of decreasing concentration. Consequently, while the ovalbumin molecules were piling up at the surface, they were also diffusing back into the bulk of the solution. Thus, the apparent limiting flow rate could be linked to the rate of diffusion of the ovalbumin.

Just how has this demonstrated the applicability of reverse osmosis to sewage and effluent treatment? It has shown that, for relatively small pressure drops, good separations of large molecules, including most all viruses, can be made. In addition, it demonstrated the possibility of separating smaller molecules and even atoms and ions by using large molecules that have an affinity for these molecules, atoms, or ions. This might especially be useful for separating trace elements such as mercury and cadmium. Finally, it has shown that to be practical the solution at the interface must be constantly replenished, which suggests the use of a very desirable continuous operation.

Just how much of this is hot air? Well, reverse osmosis has already found uses in desalination of sea water. In addition, it is also finding places in the food industry (2) (perhaps your new instant coffee was de-watered using reverse osmosis). But the most conclusive evidence of its potential in effluent treatment comes from the recent announcement that a portable unit has been developed which will be used in the U.S. Army mobile hospitals to produce potable water from their sewage (3). So, the technology is with us, and with the advances which the future will undoubtedly bring, it should provide an effective weapon in water pollution control.

(1) Sourirajan, S., "Reverse Osmosis," Academic Press, Inc., New York (1970), pp. 1-5.
(2) Merson, R., Ginnette, L.F., Morgan, A.I., "Water Removal in the Food Industry," **Dechema,** 1969, 63 (1125-43).
(3) Gouveia, Americo, Hootan, K.A.H., "Potable Water from Hospital Wastes by Reverse Osmosis," **Chem. Eng. Progr. – Symp. ser.,** 1968, 64, pp 90 –.

# ENGINEERS GUIDE TO COMPARATIVE VALUES IN ZINC vs. PLASTICS

## Unreinforced Plastic vs. Die Cast ZINC*

| Material | RATIO OF COSTS FOR EQUIVALENT LEVELS OF VARIOUS PROPERTIES | | | | | |
|---|---|---|---|---|---|---|
| | Tensile Strength at 24°C | Tensile Strength at 80°C | Flexural Strength at 24°C | Tensile Creep (100 hrs.) at 24°C | Un-notched Tensile Impact Strength at 24°C | Flexural Fatigue Strength at 24°C |
| ABS | 2.54 | 3.46 | 1.37 | 12.3 | 2.78 | 0.91 |
| Nylon 6/6 | 4.72 | 5.40 | 2.70 | 85.6 | 1.64 | 1.91 |
| Polyacetal | 3.09 | 5.00 | 2.40 | 29.0 | 3.60 | 1.42 |
| Polycarbonate | 3.82 | 3.60 | 2.33 | 20.0 | 1.70 | 3.40 |
| Polypropylene | 2.00 | 3.13 | 1.10 | 37.7 | 1.09 | 0.52 |

***SAE 903 Die Cast ZINC = 1.0** ****Costs as of January 1970, (carload lots or maximum quantity bracket). All calculations are based on these figures.**

## Glass Reinforced Plastic vs. Die Cast ZINC*

| Material | RATIO OF COSTS FOR EQUIVALENT LEVELS OF VARIOUS PROPERTIES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tensile Strength at 24°C | Tensile Strength at 80°C | Tensile Stiffness at 24°C | Tensile Stiffness at 80°C | Flexural Strength at 24°C | Flexural Strength at 80°C | Flexural Stiffness at 24°C | Flexural Stiffness at 80°C | Tensile Creep (1000 hr.) at 24°C | Notched Tensile Impact Strength at 24°C | Flexural Fatigue Strength at 24°C |
| Gl. Re. Nylon 6/6 | 1.91 | 2.68 | 8.42 | 8.90 | 1.82 | 1.91 | 20.5 | 16.7 | 7.85 | 3.83 | 1.96 |
| Gl. Re. Polycarbonate | 3.36 | 2.68 | 10.0 | 5.27 | 2.56 | 2.05 | 20.4 | 3.05 | 5.46 | 9.24 | 2.88 |
| Gl. Re. Polyacetal | 4.73 | 5.40 | 12.7 | 11.1 | 4.20 | 3.78 | 26.4 | 5.04 | 9.45 | 20.9 | 2.81 |
| Gl. Re. Polypropylene | 2.83 | 2.74 | 5.26 | 11.4 | 2.48 | 2.39 | 13.1 | 6.30 | 6.51 | 13.2 | 1.69 |
| Gl. Re. Polysulfone | 4.00 | 3.21 | 12.7 | 6.66 | 3.39 | 2.78 | 23.7 | 5.44 | 4.83 | 16.5 | 3.76 |
| Gl. Re. SAN | 1.63 | 2.14 | 4.37 | 2.78 | 1.70 | 1.49 | 9.70 | 1.84 | 1.90 | 10.1 | 1.14 |

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Energy to burn, figuratively—that wealth possessed by the young, in mind no less than body.

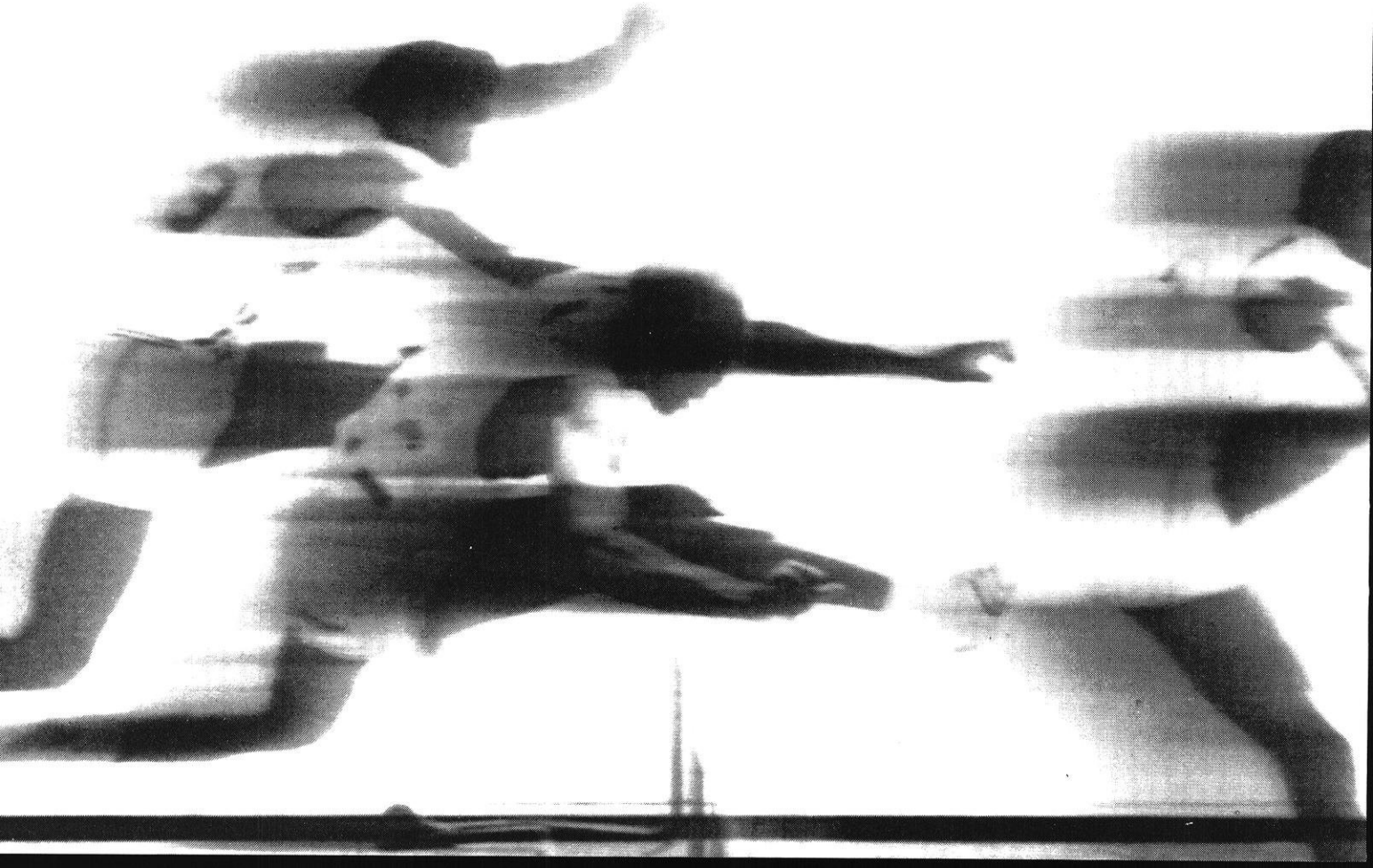
Energy to burn, literally, because ideas—freedom, equality, well-being, conservation of our natural environment—must be turned into realities—food, shelter, warmth, access, economic independence and the physical means to accomplish our goals. Atlantic Richfield is an energy company—in all these ways. One of the nation's thirty leading industrial corporations, and one of the ten companies producing most of our energy needs, with a strong position in diversified chemical products as well as in oil and gas.

A young company still extending its boundaries as it joins the efforts and resources of the Atlantic, the Richfield and now the Sinclair Oil Companies. Aggressive and imaginative in management. Flexible in organization and operation. Open to fresh thinking. Responsible in outlook. Offering new opportunities to financial and systems analysts, accountants, auditors, engineers, geologists, geophysicists, sales representatives, agronomists and programmers.

We invite your interest. See our representative on campus or your Placement Director.

## AtlanticRichfieldCompany

An equal opportunity employer M/F.



# CAMPUS COMMENTS

### AIChE

Again this year, the student chapter has been invited to be the guests of the Wisconsin Section of the AIChE at their November dinner meeting. Professor Dale Rudd will be the featured speaker at the meeting to be held at Maxine's French Quarter on November 10.

### ASCE

ASCE has planned two meetings for the month of November. The first will be held on Wednesday, November 3, 1971 at 7:30 p.m. in the Union South. Mr. William C. Hanlon of Firestone Rubber Company will show the film "Racing." This film is about the Indianapolis 500 and Mr. Hanlon will answer questions about auto racing.

Professor John Klus of the U.W. Extension will speak on Wednesday, November 17, 1971. His topic will be "Engineering Ethics."

### ASME

ASME will hold its monthly meeting the week of November 7. A free lunch will be provided for members.

Also, all members are invited to a plant tour of OHIO MEDICAL COMPANY in mid November.

A sign up sheet for the plant tour and the time and date of the meeting will be posted in the M.E. lobby.

### IEEE

If you are interested in graduate work in the Electrical Engineering department, come to the Wednesday, November 3, 1971 meeting of IEEE. A panel of EE professors will talk about their work and outline the graduate studies of their speciality at 7:00 p.m. in room 1227. All undergraduates are invited.

Meetings with speakers are also scheduled for Wednesdays, November 17 and December 1, 1971 at 7:00 p.m. in room 1227.

### SAE

The Society of Automotive Engineers will hold their monthly meeting on November 17, 1971 at 7:30 p.m. Mr. George W.Vaught, Chief Tire Engineer for Sears Robuck and Company will speak on "Off – Road Racing." Movies on the Mexican 1000 Off – Road Race and East African Safari will be shown.

### SCPR

The purpose of the Student Committee for Public Relations is to help school students understand what engineering is and to bring qualified students to Wisconsin. This accomplished through tours of the engineering campus, a high school visiting program at semester break, and a symposium for transfer students. All of these are annual events.

Students who would like more information regarding this committee are asked to contact Professor Greenfield, room 19, in T-24, or the Freshmen Office.

### THETA TAU

Theta Tau, a professional engineering, fraternity, has recently had seven new pledges joining its ranks. They include: Alan Brooker (M&ME), Thomas Burtard (ME), Gerrit Janssen (EE), Clifford Nadolna (ME), Stephen Napp (ChE), Jack Van Derhei (ChE), and Robert Zik (M&ME). Congratulations for adding an important phase to your engineering background.

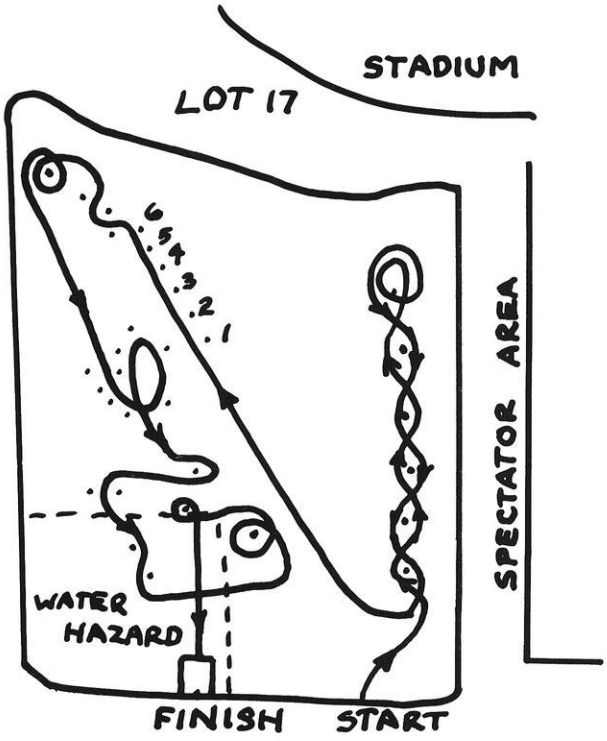
On November sixth there will be an open house for parents and alumni preceding the football game and a victory celebration at the house that evening. Later on in the month, a trip is planned to Minnesota to follow the Badger football team.

The annual regional convention of Theta Tau will be held at Beta Chapter in Houghton, Michigan on November 30. Technical presentations will be made by the chapters from Iowa, Minnesota, Michigan Tech, and Wisconsin.

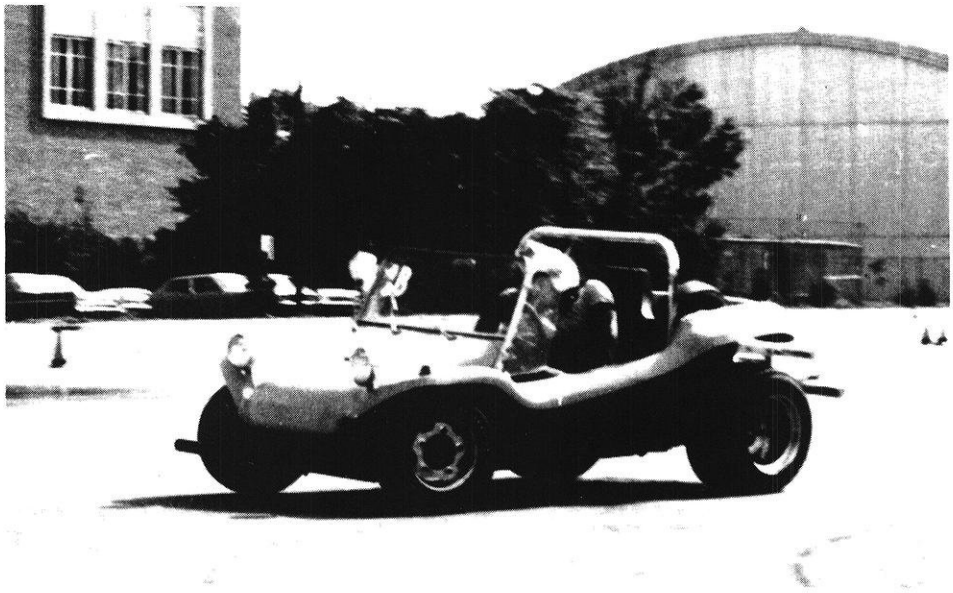
# GYMKHANA

On Saturday, October 2, 1971, the Society of Automotive Engineers sponsored their semi-annual Gymkhana. The five class event was held in Lot 17 behind the Mechanical Engineering Building on a slalom course featuring a series of staggered gates, a water hazard, several $360^0$ turns and a long straight away ending in a sharp turn. Drivers tried to complete the course in the shortest amount of time without disturbing any of the pylons which marked the turns and gates. There was a three second penalty for each pylon disturbed.

Besides being a competitive contest, it was also an informative experience as each car underwent a safety inspection before entry in which shock absorbers, wheel alignment, throttle linkage, brakes, and tires were checked. Also, once on the course, the drivers learned how their cars handled and what vehicle modifications could be made to improve the performance and capabilities of their cars. The contest also brought out the driver's skills in handling tight turns, hard braking, and wet pavement.




Andy Muetterties



Rick Burg

Winner of the Class A competition, for high performance cars was Professor Andrew Frank, driving a turbo-charged Corvair, and clocked at 1:29.0 seconds. In Class B, for sports cars, Sheldon Busse won with a Volkswagon powered dune buggy. His time was 1:26.7 seconds. Greg Anderson took Class C, the non performance cars, driving a Corvair, in 1:39.8 seconds. Class D, the compact division, was won by Bill Fragerstrom in 1:32.8 seconds. He was driving a Volkswagen. Mike Baxter turned in the best time of the day – 1:19.3. He was entered in the motercycle division, Class M, and was driving his 90cc Honda.

Andy Muetterties

# Static

"You look like Helen Green!"
"I don't look so good in red either."

* * * * *

The poor duck hunter in his blind
is chilled in front and wet behind.
It's seven hours since he's been fed
And twenty since he's been in bed.
It cost him near a hundred bucks
To hide himself from silly ducks,
Which presently, ere day dawns dim,
Will raise and hide themselves from him!

* * * * *

E.E.s wonder why girls with streamlined figures offer the most resistance.

* * * * *


What did the M.E. say to the E.E.?
"Uh, I don't know."
Right!

* * * * *

Piece Now!!!!!

* * * * *

Overheard:
Professor: "What do you think should be done about pollution?"
Student Lawyer: "Science should develop a better way of handling waste products."
Chemistry student: "The government should fine the factories and businesses until they stop polluting.
Business student: "What's pollution?" I don't see anything."
Engineering student: "I think we should go to the moon."

* * * * *

Fun . .Fun . .Fun . . . . . .Worry . . Worry . . . Worry
We can't find for love nor money,
A joke that's clean and also funny.

* * * * *

There once was a fan at Camp Randall
who drank more rum than he could handle.
Whether we win or we lose,
he keeps drinking the booze.
Hurray for the fan at Camp Randall.

* * * * *

As you remember from last month, Eddy Current and Anne Ion met at the dissipation function where on the Wheatstone Bridge Eddy was proclaiming his acute oscillations for Anne. Here we continue our story:

Alas, there was also in this cavity a mean dipole who was resolved to marry the beauteous Anne, using coercive force if necessary. Having followed Anne and hearing these murmuring of love he went Pi-ied with fury, and crept steathily upon the couple with velocity V, his joules drooling with the bestial erg that moved him.

"LC Schmidt!" cried Anne.

"What the infra-red are you doing here, you flat-bottomed vial villian?" demanded Eddy as the situation grew tensor.

Schmidt advanced to choke the beautiful coil; Eddy offered resistance (R) and his capacity (C) for absorbing the charge (Q) but LC suffered little lost work content in knocking Eddy out to infinity with a severe blow on his negative charge. Eddy made a quick comeback with acceleration (A), stripping off Schmidt's outer electrons. Eddy so upset the villian's equilibrium that he was converted into cosmic radiation and vanished in the realms of space, leaving Eddy the resultant vector in the combat.

Old Cation, attracted to the spot by Schmidt's oxidation beamed upon the young dipole. "Brave young lad," he emitted. "You have satisfied the boundary conditions and by the theorem of uniqueness you are the only one for my daughter."

"Our love will not be transient," said Eddy as he formed a closed circuit about her.

"Darling we will raise a one parameter family of second order infinitesimals," murmured Anne Happily, as time T approached e . . .

* * * * *

The ad shown below has told the public about a Kodak product intended to save people from a life of mental retardation.

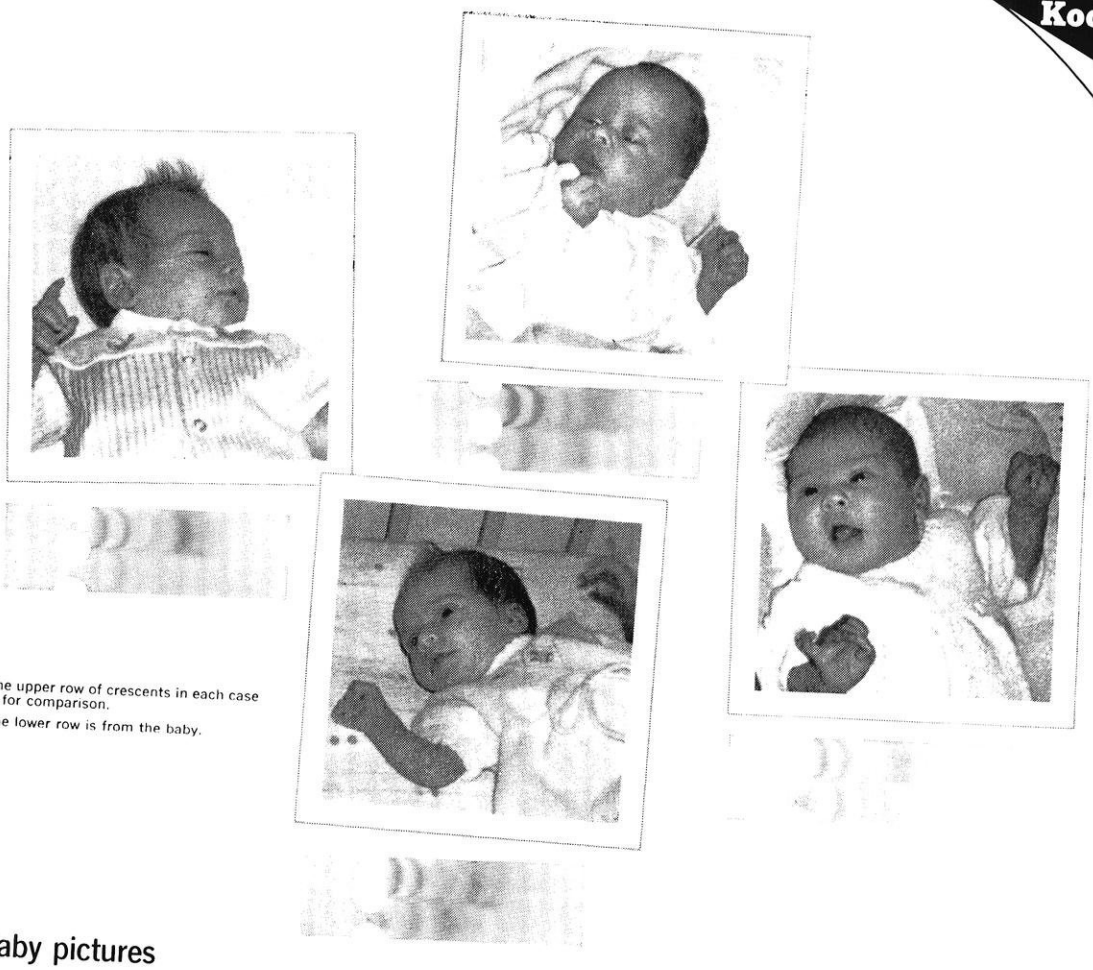
A young Kodak technical guy convinced us
we ought to market that product.

Convincing us was not easy.

*Nobody* who wants to do a little good in the world *ever*
has an easy time of it, *any place.*

EASTMAN KODAK COMPANY

**Kodak**



The upper row of crescents in each case is for comparison.

The lower row is from the baby.

## Baby pictures

Seen here as strips beneath the familiar kind of baby snapshots is a new kind, made from urine samples donated by these healthy new citizens. (A test of blood plasma is also desirable.) The strips tell about body chemistry. One out of many thousands of such patterns may turn up with a prominent crescent in the lower row at this particular point

Such is the hint that the infant's body is mishandling phenylalanine, a required substance that results from digestion of any natural protein food, like milk. If this continues, the child will probably suffer mental retardation.

Most states already require a test for this condition. If after the first weeks at home babies had an additional blood test with one of these snapshots, chances would increase of detecting other such metabolic defects. Unrecognized and untreated, many of these also lead to retardation and other severe impairments.

Treatment consists of precise regulation of diet.

Kodak, long known for simple snapshots, also makes the material on which these simple non-photographic ones are taken. (Thin-layer chromatograms, they're called.) No camera, only a few plastic accessories.

The physician's time and insight are required only for the infant whose test falls outside the common range of variation—to decide on more detailed confirmation of abnormality and, if confirmed, on remedial measures.

Cute baby pictures are both priceless and remarkably inexpensive. So is this less cute, biochemical kind. Who ought to pay for it is an interesting question in ethics, politics, and economics. Here is one place where industry's ambitions for efficient production may encounter little opposition.

# HOW CAN A SHEET OF SILICONE RUBBER HELP TURN A TEN-YEAR-OLD INVALID INTO A TEN-YEAR-OLD ATHLETE?

A few years ago, General Electric engineers developed a silicone copolymer rubber with some remarkable properties.

It's a membrane that permits the rapid exchange of oxygen and carbon-dioxide molecules.

So it's made a revolutionary new artificial lung possible. The GE Peirce lung™ oxygenates blood in much the same way the human lung does.

That's a major engineering accomplishment. But that's not the reason it's important.

The GE Peirce lung works with a minimum of disturbance to blood cells. So it can be used safely much longer than conventional lung machines. Days instead of hours.

That extra time may be what a doctor needs to repair the defective heart of a child. To open the clogged arteries of an adult. Or to save the life of an accident victim whose lungs give out.

That extra time may be all it takes to help put thousands of those invalids back on their feet.

It's a pretty clear example of how a technological innovation can help solve a social problem. A lot of times, the effect of technology on society is rather direct.

That's why at General Electric, we judge innovations more by the impact they'll have on people's lives than by their sheer technical wizardry.

Maybe that's a standard you should apply to the work you'll be doing. Whether or not you ever work at General Electric.

Because, as our engineers will tell you, it's not so much what you do that counts. It's what it means.

GENERAL ELECTRIC