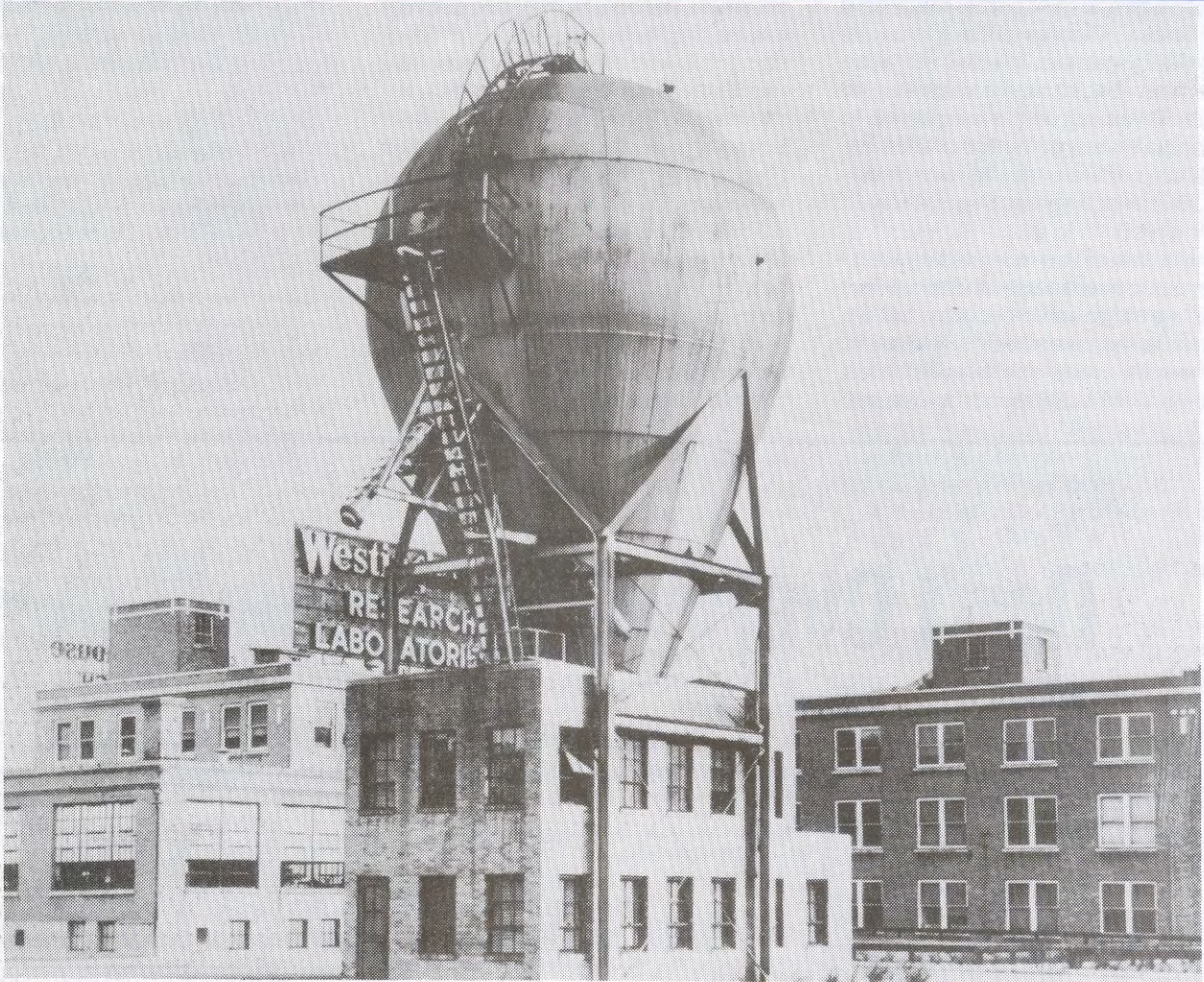


western engineer

Volume 69, Number 7

JULY 1985



THE WESTINGHOUSE ATOM SMASHER: A LANDMARK IN INDUSTRIAL NUCLEAR ENERGY

See page 8



PRESIDENT'S MESSAGE

John E. Boring
President — Colorado Society of Engineers



Your new Board of Directors has met once and that's not all that's new. We have a new streamlined Constitution and By-Laws, a new office and a new year ahead. The new Board is really new. Walt Howat is the only "old" face there from about four years ago and he is after Wyoming with a vengeance to get the golf rivalry going again. We have fewer committees this year and, hopefully, the net activity will be greater with fewer directions to go.

Only a few of you indicated an interest in a summer activity and those few didn't agree on which activity. So we are taking the summer off. Because of the new By-Laws, the Board doesn't have to meet each month so we are

taking the summer off too. Our next Board meeting is scheduled for August 15 so we can get a jump on the year's activities. The only activity this summer will be the President's Cup Golf Tournament. Melissa Browning-Sletten got this off the ground early. I personally am challenging Forrest Scruggs to take the longest drive award away from me. And I'll challenge the rest of you to take it from both of us.

Tom Grethel will work with J.P. Oxenham and Gib Rindahl on the Publications committee and, of course, Uncle John only gave up his column. John works hard because he needs an excuse for his wife to say he's tired and needs another trip to Ireland to refuel.

Al Cook thinks a second year on the Membership committee will produce even better results than last year. Dee-dee Burroughs will be spending a full day each week on Membership also. Jack White will chair the Program committee and get great programs to follow the ones Howard McGregor lined up last year. Leslie Sour has been asked not to serve on a committee but to take on a much more important and more valuable activity for CSE. She is going to free lance activity ideas with the Junior Members and see if they can be CSE firebuilders. Fred Nagel wants another go at the Telephone committee to get higher attendance at membership meetings.

The Board has been given the summer off but cautioned not to forget CSE and to be thinking and come to the August Board meeting with ideas and some full committee memberships. If

Continued on page 11

COVER PHOTO: The atom smasher as it looked shortly after its construction in 1937. Courtesy of Westinghouse.

Don't Overlook Overhead Lines

Overhead power lines are such a common sight that it's easy to overlook them. That's a mistake—sometimes a deadly mistake.

Every year some people are needlessly injured or killed by coming into contact with power lines. That's why you need to be especially alert when operating construction equipment, working with broadcast antennas, trimming trees or working with ladders. And that goes for anyone working for you as well. Just a friendly reminder from Public Service Company.



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DOUGAN'S NOTES

By James M. Dougan



With time, even the most enjoyable sideline becomes burdensome. The column continues. Perhaps different in small ways, but essentially the same in its focus as with its founder. Congratulations, John, for a job well done for so many months (years?) and thank you for the enjoyment of seeing one's name in print and learning of the personal goings-on in the Society.

For those of you who missed the installation of officers, you missed the following: the beautiful view, fine food, an enjoyable band, good company, and a sterling performance by Ron Ackerlow.

Remember your golf tournament August 9. Since member Lee Tautz now lives in Arrowhead, perhaps he will help host the Society around his home course. Anyone else who wants to help our tourney chairwoman Melissa Browning-Sletten, please give her a call at 329-1784. We need at least two people to help. VOLUNTEER OR BE DRAFTED.

Bill Ashton, a CSE member since 1981, has begun building a large expansion at the local sewage treatment for the City of Longmont. The engineering firm for the city, McCall Ellingson Morrill (per Lyman Flook), expects the project to be completed in early 1987.

Surviving his term as president of the Colorado Contractor's Association, Earl Lawrence now serves on three national

contractor committees. Earl's son recently received his P.E. Congratulations. We'd like to extend an invitation for both father and son to support the Society. Two other contractor/CSE members, Fritz Krueger and Jim Kenney, were elected to serve as National Directors for the Associated General Contractors of America.

George Frohlick is no sign painter but he sure knows how to pick real estate. Understand he has such demand for space in his building that he's selling his surplus outside stored items to expand his building. Good luck with your project, George.

You get out of any organization what you put into it. Now is the time to turn off the TV, call John Boring and ask him what job he needs you to do. We only need 230 people to make the year fulfilling so don't pass the buck. That's **every one** of the Life Members, Junior Members and Members.

Uncle John's Addendum

A compliment to Jim Dougan's initial essay — in my opinion he should be great. Now there must be a contest to name the column.

July, after two and half years, a month with two full moons — so will the next interlude be before another repeat of two moons in a month.

Saw Vernon and Winnie Hines in one of the local furniture stores. They have

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STATE BOARD REPORT

By Susan Miller — Program Administrator

The Colorado Board of Registration for Professional Engineers and Professional Land Surveyors is very pleased to announce that House Bill 1209 was signed into law by Governor Lamm on May 24, 1985 at 3:34 P.M. We appreciate the efforts of all those who assisted the Board with the legislation. The new law will go into effect on July 1st and will be sent to all active registrants and retired professional engi-

neers as part of this year's annual report which should be in the mail to you by the beginning of July.

The Board is initiating rule making in response to the new statute and notice of the hearing is listed below. Your comments on the Board's bylaws, rules of procedure and rules of professional conduct are welcome and **needed** so that the safety of the public will be maintained. The Board will look forward to seeing you at the hearing.

NOTICE OF RULE MAKING HEARING

Pursuant to C.R.S. 24-4-103, C.R.S. 12-25-107(1)(a) (effective July 1, 1985), C.R.S. 12-25-107(1)(b) (effective July 1, 1985) and C.R.S. 12-25-207(1)(a) (effective July 1, 1985), you are hereby advised that the Board of Registration for Professional Engineers and Professional Land Surveyors will hold a public rule making hearing on July 19, 1985 commencing at 1:00 P.M. in Room 560, 1525 Sherman Street, Denver, Colorado for the purpose of promulgating rules with respect to the engineering practice act and the land surveying practice act.

Copies of the proposed rules in the

form suggested for adoption will be available to the public upon inquiry at the Board's office on July 12, 1985. The Board's office is located at 1525 Sherman Street, Room 600B, Denver, Colorado, and is open weekdays from 8:00 A.M. to 5:00 P.M.

At the time and place stated in this notice for public hearing, the Board of Registration for Professional Engineers and Professional Land Surveyors will afford interested parties an opportunity to submit written data, review or arguments and to submit briefly the same orally if they so desire. All submissions will be considered.

DOUGAN'S NOTES

Continued from page 3

sold the ranch at Georgetown (the Society had the summer picnic at their place several years) and are moving to Grand Junction. Their new address is 1648 Crestview Drive (zip 81501), phone 243-0039.

Great shakes!! Your new Society President, John Boring, and I have the same annual birth date, May 29, so remember us next year.

Sick bay activity: Maida Harrington, Dan's wife, has been in and out of various hospitals since March 26. Diagnosis was determined in early May and surgery for a brain tumor performed on the 13th. She is recovering well. Call Dan at 233-5380 for the current progress. Dorothy Boring also was hospitalized for a hip replacement.

Bob Kenney is now producing for Newstorm-Davis. Bernadine and I were fishing at Twin Lakes, the first outing this year. However, because of the change of making one lake of the two, conditions for human-fish relations weren't the best. In three days Bernadine didn't fare well at all and I caught three; with a water rise of 10 ft., more or less, to date, undoubtedly even the fish were at a loss.

Cavis Ham was a visitor to the new Society office, from faraway Bethesda, Maryland. He returned to Secretary Robert 20 years accumulation of the **Western Engineer**. He had read the appeal for back issues to fill blank spots in the Library bound volumes. Cavis made the 50th reunion with his graduating class of the College of Engineering at the University of Colorado at Boulder. He also enjoys "Retrospect".

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RETROSPECT

By Fred Nagel

20 YEARS AGO

In the July 1965 **Western Engineer** an ad by Portland Cement Association shows a picture of workmen putting finishing touches on a newly-completed building in Denver. "A graceful interlocking design of concrete marks the lamella roof system of the Denver Botanic Gardens, designed by Victor Hornbein and Edward D. White, Jr. and engineered by Robert S. Nedell, all of Denver."

Next time you're in the area of Cheesman Park, stop at the Botanic Gardens and see this truly novel work of concrete roof construction completed about 20 years ago.

That same year "An interprofessional committee, representing planners,

architects and engineers, called for the Colorado billboard issue to appear on the ballot in the 1966 general election."

This group "— issued a joint resolution expressing dissatisfaction with the billboard legislation passed by the General Assembly."

I for one feel now, looking back 20 years, that a great improvement has been accomplished in the area which this group worked for and termed "an ever-increasing clutter of signs."

An interesting little bit of trivia appeared under the title "Russians in Leisure." I repeat it here, "A survey by the Sociology Laboratory of Leningrad University shows that the Soviet people spend 18.5% of their free time per week studying. They spend 16.6% entertain-

ing, socializing and walking, more than 14% of their free time per week reading, and 12.5% of their time watching television. Five to six percent of their time is spent with their children, public activities and movies."

According to my arithmetic, this only adds up to 68 percent accounted for. If we assume 40 hours per week of free time after sleeping, eating traveling and working are deducted, then the Soviets study in a week 7 hours, socialize 6 hours, read 7 hours, watch TV 5 hours, and are with their children 3 hours. This means that 13 hours would be unaccounted for each week and would be totally unacceptable under the American work ethic.

Next month we will in Retrospect look back 30 years to August of 1955.

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ON THE WRITE SIDE

By Susan R. Quinn



Have you ever started to write, and found that your mind went blank? Everyone suffers, at one time or another, from terror of the blank page, also known as "writer's block."

The reasons for writer's block can be lack of direction regarding your subject, dealing with a difficult situation, or just plain discomfort about writing; you may also have difficulty concentrating, or be afraid of not being perfect and not having enough information to complete the writing project.

Whether you write letters, memos or reports, if you've ever had trouble getting started, here are some suggestions for overcoming mental roadblocks in writing.

Arm yourself with the proper tools.

Everyone should have a dictionary, thesaurus and grammar book. It isn't enough to have those books somewhere in the office. You should have your own books somewhere in or on your desk; most of us will not take the time or make the effort to get up from our desks to pick up a dictionary which is on a shelf across the room.

A dictionary, thesaurus and grammar book are current for years; although the rules of grammar and writing are constantly changing, they change very slowly, so these books will be current for many letters to come.

Make time for your writing. There are several people I know who have

trouble writing because they are constantly interrupted by people walking into their offices or by telephone calls. Interruptions to your writing can be distracting, if not downright discouraging.

Put aside a time of day when you concentrate the best and when you have the fewest interruptions; for many people, early morning is the best time to write.

Dealing With Writer's Block

Some people, however, work on a different body clock; if you are "raring to go" at 6 p.m., put time aside then for your writing projects. You know when you are alert and when you are likely to be undisturbed; that's when you should plan to write.

Don't procrastinate. The worst enemy for all of us is procrastination. I know; you may be one of those people who claims that you write best under intense pressure. (If you make that claim, I suspect that you may suffer from masochistic tendencies.) How can you possibly enjoy writing if you are constantly writing against a deadline, under tremendous pressures?

Give your writing projects the same consideration that you give other work projects. Give yourself ample time to create — remember, business writing

can be creative — so that you can enjoy the process of writing. Without the pressure of meeting a deadline, you'll find that you suffer less from writer's block.

Forget about writing the perfect letter on the first try. In order to save time, we sometimes tell ourselves that we're going to "get this letter right the first time," so that we don't have to make any changes. That attitude generally causes us to freeze up; we're so busy worrying about writing the perfect letter, that we're afraid to begin writing.

Tell yourself that you are just going to think about getting the information down. You'll write a better document if you let the words flow, rather than worrying about every word.

Brainstorm. It's important to try to write down all of the ideas that you may want to cover in your writing project, without concern for the order of your ideas, word choice or sentence structure. Brainstorming will remove the pressure of being sure that you've included every single idea in your first draft, and it will help you get started on your project.

Don't be afraid of the review process. If you edit your own writing, try to review your writing as an objective, outside party. Better yet, for your more difficult writing projects, let someone else review your writing. Sometimes letting other people review our writing hurts, since none of us likes to see our writing "bleed." If you are sensitive to the criticism of others, there are ways to make their comments easier to accept.

(a) Ask reviewers to use a pencil or black pen, rather than a red pen or pencil . . . seriously. There is no reason why a regular pen or pencil can't be used. Just tell them to make their changes and put an "X" or check mark in the margin, so that you'll be able to easily locate the line where they've made their notations.

(b) Remember that you are not obligated to accept their changes (unless you have a boss who insists). People have a tendency to change any writing style to their own; if someone has done that, stay with your original word choice.

(c) Assume that they are revising in your best interest.

(d) Ask yourself if their changes contribute to the clarity of your writing; if the changes really help, incorporate them in your final draft.

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WETTER-THAN-NORMAL SUMMER PREDICTED FOR MOUNTAINS OF THE WEST

With tourists, trout, farmers and foresters in mind, two Colorado State University atmospheric scientists have devised a new experimental approach to predict this summer's weather in the West.

Elmar Reiter and John Sheaffer believe the high mountains along a banana-shaped curve following the Continental Divide in Arizona, New Mexico, Colorado, Utah and Wyoming have a high probability of receiving more rain than normal.

Meanwhile, lower-altitude basin areas to the west of those mountains also have a better than average chance of being wet through June, July and August.

In contrast, the plains of southeastern Colorado and eastern New Mexico

should be drier than normal, the scientists said.

Cities along the Colorado Front Range and from Las Cruces, N.M., to Cheyenne are in areas that should be near normal.

If the forecast holds true, their method could provide wide-reaching benefits. They devised the approach during two years of research funded by the U.S. Department of Energy.

Seasonal forecasting could help farmers, water conservationists, flood-control experts and other serious weather observers make plans to prevent crop loss, save lives and buffer the Western economy from droughts, the scientists said.

"This summer farmers in the eastern plains of Colorado and New Mexico may be happy to have a dry season and the

heat it brings because they had an abnormally moist spring and already have a good moisture base," Reiter pointed out.

The forecast might be bad news for firefighters who keep a vigil on mountain forest blazes, many of which are started by lightning. "Most summer precipitation comes during thunderstorms, so there should be a lot of lightning strikes," Reiter said.

Reiter, known for pioneering new ways to forecast long-range weather trends, and research associate Sheaffer have tested their method in the last three seasons. "The forecasts have been right on the money," Sheaffer said.

Even though the forecasting has proven reliable, the scientists added strong words of caution. "This is strictly experimental," Sheaffer emphasized.

They pointed out that summer is the hardest season for forecasting, and precipitation is typically the most difficult factor to predict. "Summer forecasts are a tough nut to crack," Reiter emphasized. "We are somewhat wary of rushing in where angels fear to tread."

Compiled with the aid of a computer, their forecast is the first time scientists have used an intricate approach that combined effects of the Pacific Ocean and ground surface conditions on seasonal weather trends.

Other forecasters have commonly based predictions on trends in one or another of these factors from previous years or seasons but have not effectively combined them to obtain reliable long-range forecasts.

The CSU forecast used 40 years of data from 400 weather stations in the West and 30 years of sea surface temperatures in the northern and equatorial Pacific Ocean, where variations in weather temperatures seem to influence monsoon-like summer weather circulation in parts of the West and Southwest.

Another important factor in the forecast procedure was the effect of El Niño, a phenomenon related to increases in ocean temperatures along the west coasts of North and South America.

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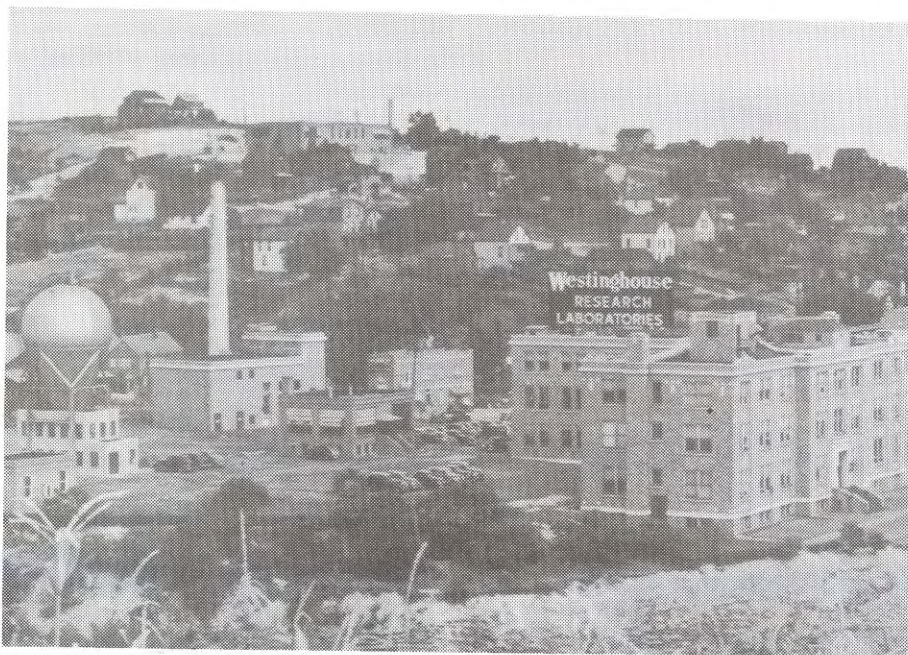
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THE WESTINGHOUSE ATOM SMASHER: A LANDMARK IN INDUSTRIAL NUCLEAR ENERGY

FOREST HILLS SITE HONORED

Westinghouse Electric Corporation's Forest Hills site in suburban Pittsburgh was honored in May by The Institute of Electrical and Electronics Engineers for the pioneering research work performed there in the 1930s and 1940s in the field of nuclear physics.

Forest Hills was home of the "Atom Smasher," a Van de Graaff accelerator, built by Westinghouse to conduct basic research in nuclear physics, research that eventually led to the development of nuclear reactors for submarine propulsion and nuclear power plants.



The Westinghouse atom smasher at the site of the research laboratories in Forest Hills, Pennsylvania shortly after its construction in 1937. Courtesy of Westinghouse.

The Westinghouse atom smasher marks the third Electrical Engineering Milestone designated by the IEEE - the world's largest technical professional organization with more than 260,000 members worldwide. The first two, both at St. John's, Newfoundland are scheduled to be dedicated later this year. They are Heart's Content for the laying of the first trans-Atlantic telegraph cable in 1866 and Signal Hill for the reception of trans-Atlantic radio signals by Guglielmo Marconi in 1901.

At a dedication ceremony attended by a number of retired employees who

were involved in the original project and by present employees of the steam generator technology division, which is now located at the Forest Hills site, two plaques were placed. One was placed at the atom smasher, the other at the site's main entrance.

The plaques read, "The 5-million volt Van de Graaff generator represents the first large-scale program in nuclear physics established in industry. Constructed by Westinghouse Electric Corporation in 1937, it made possible precise measurements of nuclear reactions and provided valuable research experience for the company's

pioneering work in nuclear power."

The "pear-shaped bulb of steel," as the generator was called, was the centerpiece of the first large-scale program in nuclear physics in this country.

Company physicists designed the generator to create nuclear reactions by bombarding target atoms with a beam of high-energy particles. The steady voltage of the generator, its chief advantage over other types of accelerators, allowed these reactions to be measured precisely. This process contributed significantly to basic knowledge of nuclear physics.

HISTORICAL BACKGROUND

The Westinghouse "Atom Smasher," an accelerator of the Van de Graaff type, was designed and built by the Westinghouse Electric and Manufacturing Company in 1937. It was the first accelerator in the world built and operated by an industrial firm to conduct basic research in nuclear physics. It marked the beginning of an effort by industry to unlock the secrets of nuclear energy.

Research conducted with the atom smasher led to the discovery of photo-fission — the phenomenon whereby uranium atoms can be split by high-energy gamma rays, releasing large amounts of energy. This research program was the initial step which led Westinghouse to the development of nuclear reactors for submarine propulsion and nuclear power plants.

The Quest for Control of Atomic Power

Westinghouse's nuclear research, via the accelerator, was begun three years before Hahn and Strassman announced the fission of uranium by neutrons in 1939. This discovery pointed the way to a possible means of releasing the energy in a nucleus.

Not long after this announcement, Westinghouse demonstrated, using the accelerator, the fission of uranium by gamma rays, a process which is a factor

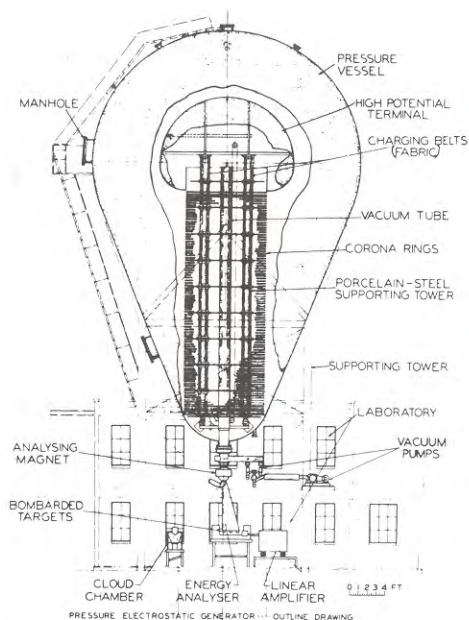


The facility marks the third Electrical Engineering Milestone designated by IEEE. Courtesy of Westinghouse.

in the chain reactions of nuclear power. Because gamma rays are radiations of energy, like light, and not particles at all, the phenomenon was called photo-fission.

Like a Huge Electrical Gun

The Westinghouse accelerator consists of a huge pear-shaped tank, 30 feet in diameter and 47 feet high. It houses an electrostatic DC generator and 40-foot vacuum tube, and is filled with air at high pressure to withstand the high voltages used. The structure, including a two-story building, is 65 feet high.



Cross section of the accelerator with principal parts labeled. Courtesy of Westinghouse.

The atom smasher is like a giant gun with a vacuum tube for a barrel. It uses 5,000,000 volts of electricity as ammunition with which to smash atoms. Such high voltages accelerate subatomic particles of matter shot through the vacuum tube at up to 100 million m.p.h.

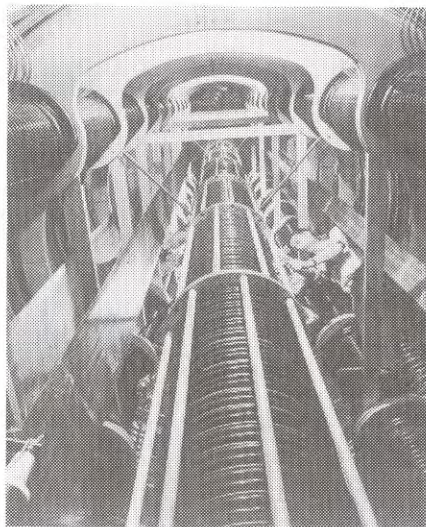
Particles speeding toward the end of the tube are first separated into categories according to their charge by a magnetic analyzer. The desired particles then strike the targets at the end of the tube with velocity great enough to pene-

trate the hard centers, or nuclei, of the atoms, producing nuclear reactions.

Smashing Atoms

To develop the huge voltage required for atom smashing, electrical charges are fed onto two fabric belts which travel the length of the column at 50 m.p.h. As the charges reach the top of their course they leak off, and are stored on a spherical electrode centered in the upper dome of the pressure tank. A potential of up to 5,000,000 volts is produced by the stored charges and repels the charged nuclei of hydrogen atoms shooting them down the tube at speeds up to 100 million m.p.h.

The hydrogen particles hit the atom target in the laboratory below with a terrific impact. The collision can break up the atomic nucleus into its several parts. Various kinds of instruments are used to identify the fragments and measure their energy.



Interior of the atom smasher during the final phases of its construction. Workers are making adjustments to the central accelerating tube tower supports. The charging belts, which carry the electrical charges to the top of the tube, are also shown. Courtesy of Westinghouse.

One such instrument is the cloud chamber, in which a rapidly moving particle leaves behind a track of condensed water vapor much as a jet airplane leaves a contrail. Observing such tracks, scientists are able to determine

the characteristics of particles bombarded out of the heart of the atom and from these learn about the structure of the original nucleus.

Early Researchers

The design of the machine, and the subsequent research done with it, was directed by W. H. Wells. Among the members of the first research group was W.E. Shoupp, who was later responsible for the technical direction of the Westinghouse program that designed and built the pressurized water reactor for submarine propulsion.

Dr. Shoupp was also responsible for the initial research and development effort on the first commercial nuclear power plant located in Shippingport, PA. He later served as technical director for the Westinghouse Atomic Power Division with responsibility for development and engineering on numerous nuclear power plants. Dr. Shoupp was instrumental in the organization of the American Nuclear Society and served as their tenth president.

These reactors were the first of a long series of successful nuclear energy sources which set the pace and still hold the lead in nuclear energy throughout the world.



Dr. W.E. Shoupp examines the beam exit port of the atom smasher shortly after research began. Dr. Shoupp played a significant role in Westinghouse's pioneering developments in commercial nuclear power. Courtesy of Westinghouse.

ENGINEER'S CALENDAR — JULY 1985

ACM

Association for Computing Machinery.
Boulder Chapter: No information at this time. For more information, contact Joe Lachman at 538-3872.

Denver Chapter: No information at this time. For more information, call the ACM answering machine at 988-4265.

ACSM

American Congress of
Surveying and Mapping.

No meeting for July. If anything comes up that needs attention, please contact Duane Senn at 695-7550.

AEG

Association of Engineering Geologists.
The next meeting will be in September.

AICHE

American Institute of
Chemical Engineers.

The next meeting will be in September.

AIME/SME

Society of Mining Engineers
of the American Institute of
Mining, Metallurgical and
Petroleum Engineers.

The next meeting will be in September.

AIME/SPE

Society of Petroleum Engineers
of the American Institute of
Mining, Metallurgical and
Petroleum Engineers.

The next meeting will be in September.

AIPE

American Institute of Plant Engineers.
The next meeting will be in September.

AIPG

American Institute of
Professional Geologists.

For information, please contact Steve Krajewski at 534-3667.

ASCE

American Society of
Civil Engineers.

Colorado Springs Chapter: The next meeting will be in September.

Western Chapter: For information, call Dave Sorenson at 320-6400.

ASHRAE

American Society of Heating,
Refrigerating, and Air Conditioning
Engineers.

The next meeting will be in September. The Energy Conservation meeting will continue to meet the 1st Wednesday of each month throughout the summer and next year. Meetings are held at 12:00 noon at King Soopers Headquarters, 65 Tejon. For more information, contact Steve Hultin at 433-6721.

ASME

American Society of
Mechanical Engineers.

The next meeting will be in September.

ASPE

American Society of
Professional Estimators.

The next meeting will be in September.

ASSE

American Society of Safety Engineers.
The next meeting will be in September.

CCSSE

Colorado Chinese Society of
Science and Engineering
(formerly CCEA).

We will be having a picnic. Please contact Dr. Paul Cheng at 977-1871 for more information.

CEC

Colorado Engineering Council.
The next meeting will be in September.

CECC

Consulting Engineers
Council of Colorado.
No meeting for July.

CSA

Colorado Safety Association.

Events for July include:

2nd-3rd — Defensive Driving Course, 5:30-9:30.

11th — Seminar: "Managing Time Effectively" 8:30-4:30.

19th — Traffic Division meeting.

25th — Seminar: "Confined Space Entry" 8:15-4:30.

26th — Oil and Gas Committee meeting.

For more information, contact Bob Hopper at 629-6255.

CSE

Colorado Society of Engineers.

There will be no meeting in July. A golf tournament and Board meeting are scheduled for August. For more information, call the CSE office at 433-3133.

CSNHR

Colorado Society of
Natural Hazards Research.

For information, please contact Roy Spitzer at 744-7105.

DFCPEG

Denver Federal Center
Professional Engineers Group.

No information, please contact Floyd Summers at 231-1147.

EXTRACTIVE METALLURGY CHAPTER OF DENVER

The next meeting will be in September.

IEEE

Institute of Electrical and
Electronics Engineers

The next meeting will be in September.

IES

Illuminating Engineering Society.
The next meeting will be in September.

ISA

Instrument Society of America.
The next meeting will be in September.

PEC

Professional Engineers of Colorado.
There will be no meetings for any chapter until September.

PES

Pueblo Engineers of Colorado.
The next meeting will be in September. For information, contact Mark Koester at 1-594-4200.

PI/USA

Packaging Institute of America.
The next meeting will be in September.

PLSC

Professional Land
Surveyors of Colorado.
The next meeting will be in September.

RMAG

Rocky Mountain Association
of Geologists.

Events for July include:

5th — No meeting.

12th — Dan Domeracki, of RPI, Boulder. His topic will be "Leo Sandstone in Wyoming."

19th — Robert Bereskin, Consultant, Salt Lake City, Utah. His topic will be "Middle and Upper Devonian Carbonate Stratigraphy of Portions of South & Central Nevada: Implications for Explorationists."

26th — Robert J. Weimer, of the Colorado School of Mines, Golden. His topic will be "Influence of Depositional Facies on Hydrocarbon Production in Pennsylvanian Ten Sleep Sandstone, Big Horn and Wind River Basins, Wyoming."

For more information, contact Bill Precht at 779-0079.

RMWPCA/AWAA

Rocky Mountain Water Pollution
Control Association/American
Water Works Association.
The next meeting will be in September.

SAE

Society of Automotive Engineers.
No information, please contact Cathy Sherepita at 744-4647.

SAME

Society of American Military Engineers.
Luncheon meeting, July 16th. Cocktails at 11:30, lunch at 12:00, and program at 12:30 p.m. To be held at the Lowry Officers Club. Speaker to be announced. For more information, contact Tom Hicklin at 431-6100.

SMPS

Society for Marketing
Professional Services.
Monthly Luncheon July 3, 1985. Meetings held the first Wednesday of each month, Cherry Hills Country Club 11:30 A.M. Call Elaine Joyce 292-5722.

SSS

System Safety Society.
For information, contact Rich Tower at 977-9292.

SWE

Society of Women Engineers.
For information, please contact Annette Schulz at 293-5175.

WIM

Women In Mining.
Summer Field Trip. For more information, contact the WIM office at 298-1535.

PRESIDENT'S MESSAGE

Continued from page 2

you get a call to help — do so.

Our usual meeting in September is

the Tuesday after Labor Day and we have a poor attendance. This year we will postpone that meeting until Sep-

tember 17. Mark your calendars and come revved up to be active this year. Have a fun-filled and relaxing summer. And come September be a firebuilder with us.



COLORADO SOCIETY OF ENGINEERS

1985 Golf Tournament

August 9

Arrowhead Golf Club

in

Littleton

Tee Off 12:30 p.m.

\$35 per player

(Includes green fees, golf cart and prizes)

Optional cold cut buffet \$8 per person

Call the Society office for reservations 433-3133

Upcoming Event

COLORADO SCHOOL OF MINES
Office of Continuing Education

COURSE:
BULK MATERIALS HANDLING

DATE:
August 5-8, 1985

INSTRUCTORS:
Dr. David J. Spottiswood, Professor, CSM; Dr. A.T. Yu, Chairman ORBA Corp.; H. Colijn, Consulting Engineer, Hendrick Colijn & Assoc.; W.E. Sabina, Consulting Engineer, W.E. Sabina, Inc.
FEE: \$495

LAWRENCE M. ROBERTSON — AN AUTOBIOGRAPHY

While in college I was employed for one summer by the Denver Gas and Electric Light Company, testing electric meters on customer premises in 1921, and I entered full-time employment in June, 1922. I worked again in the Electric Meter Shop until January, 1923, then went into a planned program in the electric department for two years. I worked in various departments such as Distribution, Line Construction, General Accounting, Results Engineer at the Lacombe Generating Station, Transmission and the Station Department. This was a training program since the Junior Engineer Program had been eliminated during the war. My program was terminated in July, 1925. I was then put in charge of the Transmission and Station Engineering Department.

I was made Assistant Superintendent, Hydro Production and Transmission Department in April, 1948. In February, 1953, I was made Chief Electrical Engineer. In September, 1959, I was promoted to Manager of Engineering and in December, 1966, I became Vice President, Engineering-Electric Department, which included Construction.

During this time (1962-1967), we at the Public Service Company and the Stone and Webster Engineers were designing and building the Cabin Creek Pumped Storage Project, which allows off-peak power to be stored for later use. This was located in the Arapahoe National Forest and therefore under the jurisdiction of the Federal Power Commission. They required maps of the project, detail drawings and design information. All these proposals had to have the commission's approval including any changes.

We had no such experience in this area, but I mentioned to one of the staff engineers that this was being prepared. On one trip he escorted me to another building housing the Licensing Group and introduced me to Mr. Frank Thomas who was in charge. The staff engineer said "Dr. Robertson wants to build a Pumped Storage Hydro Project in Colorado." He wanted to know if I was a native of Colorado and from what uni-

versity I received my degrees. I replied that it was the University of Colorado at Boulder and the degrees were in Electrical Engineering. He said, "Well, I got my degree from the University of Denver, but we won't let that make any difference." From then on, we became very close friends. His parents lived in Denver and when he came to Colorado I would take him to Georgetown to see the project. So he was kept up-to-date and when questions arose, I could explain problems to him over the phone, which saved a lot of time.

"They installed bulb turbines in the Rock Island Dam.

These were the first in the U.S. of this type which had horizontal axis."

One major event occurred when the general contractor suggested to me that we could save money if the large, vertical water tunnel running from the bottom of the upper reservoir to the large horizontal tunnel and then to the power house was changed from a vertical inclination to a slope of 55 degrees for 1,019 ft.

We talked to the Stone and Webster Engineers and they finally agreed. It was also approved by the company management. But this meant a change in plans and required the approval of the commission. I called Frank and told him. He said he would be in Denver to see his parents and we could discuss it. When he went back to Washington, he met with the Commission and then he gave me approval that week. He took special interest in this job and once he introduced me to the engineer he had assigned to the project. He said, "This is Al Thomas. He went to Colorado University, but he is okay," and laughed.

When I retired from the Public Service Company in 1968, I was Vice President of Engineering and Construction. I then decided to go into consulting engineering work and I have had some fascinating jobs.

In 1969 I got a request from the Argentine government to go to South America because they needed some planning and advice on their public utility system. So I traveled to Buenos Aires and La Plata and stayed there for about three months. I was supposed to work out plans for a substation, recommend a location for the power lines, and draw up a schedule of operation. But when I arrived I discovered they were having problems with their insulators and experiencing frequent power outages.

At that time the dictator of the country had issued an order demanding that all products had to be purchased in Argentina unless you could not find a certain item in the country. But the insulators produced in Argentina were failing. So about a week before I left, I wrote up some suggestions and said they should either purchase their insulators on the world market or produce a better product.

I got along very well with the people, and, in fact, they wanted me to stay there. But I didn't feel that my roots were there, so I returned to Colorado.

In 1971, I served as a consultant for an expert witness for the Adolph Coors Company in their effort to prevent construction of a second power line leading west and paralleling one for Rocky Flats substation. In my judgment it was feasible to use just one line, but a court ruled against us.

Another fascinating consulting job that I had was in Wenatchee, Washington. The Rock Island Dam was built there on the Columbia River in 1930. There was a lot of energy wasted as water ran over the dam, so they hired Stone and Webster to design a power plant.

I was selected as one of a four-man board of consultants hired to advise the Public Utility District of Chelan County on the design and expansion of the Rock Island Project. This lasted three years, from 1976 to 1979.

They installed bulb turbines in the Rock Island Dam. These were the first in the U.S. of this type which had a horizontal axis. They bought these turbines from the French — they were the larg-

est ever built, at 50,000 kilowatts capacity. The Rock Island Project consisted of a hydroelectric plant and associated 115 Kv Transmission lines and substations.

In 1981, I was hired as an engineering consultant to the Corporacion Dominicana de Electricidad in Santo Domingo, the Dominican Republic. They asked me to review the specifications and make suggestions on the Lopez-Angostura Project, which consisted of a remote-controlled hydroelectric plant, a 138 Kv transmission line, and substations. I was in Santo Domingo for about a month while it was winter in Colorado, so I felt like I was in Hawaii. The weather was just beautiful and I really enjoyed my stay there.

I am a registered Professional Engineer in Colorado (No. 565), Wyoming, New York, Illinois, California and Washington. I was appointed a member of the Colorado State Board for Registration of Professional Engineers and Land Surveyors from 1957 to 1969 and served as Chairman for the last nine years. In 1967, I was National Director of the National Council of State Boards of Engineering Examiners.

I was elected to the Sigma Xi, the Scientific Research Society of North America, Boulder Chapter, in 1984 and also became a member of the American Association for the Advancement of Science in the same year.

In 1968, I received the Distinguished Engineering Award of the University of

Colorado in the Industry and Commerce category. This was the third year of the award.

I was named to C.U. Engineering Development Council Board of Directors from 1969 to 1981 and am a member of the Distinguished Engineering Alumnus Awards Committee as well as Chairman of the Committee from 1972 to 1984. I have very fine plaques for these activities and awards.

There was a course in Engineering English offered at CU by Professor Otto Birk. He was a very good teacher and I learned a great deal from his course. He and I became good friends. Over the years, I have had 83 paper and articles published and a chapter on power in

Continued on page 14

NATURAL GAS FUELED COGENERATION TECHNOLOGIES SEMINAR

Sponsored by the American Gas Association and the Rocky Mountain Gas Association
July 16, 1985

At the Regency Hotel I-25 & 38th Avenue (Exit 213)
3900 Elati Street, Denver, CO 80216
In the "House of Commons" Conference Room

Hotel Reservations: 458-5511 or 800-525-8748

9:00- 9:20 a.m.	Introduction and Overview of Gas Fuel Cogeneration. Dave Scignoli, Director of Industrial & Commercial Marketing, A.G.A. Commercial Energy Systems Marketing Committee, A.G.A.	11:55- 1:10 p.m.	Luncheon Speaker - Pete Smythe, Mayor of East Tincup Springs for the Wagons and Grease for the Wheels
9:20- 9:55 a.m.	Ron Lehre - Colorado Public Utilities Commission (Tentative)	1:10- 1:45 p.m.	Bob Osborne, U.S. Turbine, Allison
9:55-10:30 a.m.	Thermo-Electron Company	1:45- 2:20 p.m.	John Sasso, Midwest Market Development Engineer, Gas Energy, Inc.
10:30-10:45 a.m.	Break	2:20- 2:55 p.m.	James R. Clements, Business Development Manager, Energy Factors
10:45-11:20 a.m.	Frank Lamphere, Cogeneration Marketing Manager, Caterpillar Tractor Corporation (Solar Turbines and Martin Cogeneration Systems)	3:10- 3:30 p.m.	Tom Downing, Manager, Combustion Control System, Air Pollution Monitoring Controls
11:20-11:55 a.m.	Robin MacKay, Director Industrial Market Development, Garrett Gas Turbines	3:30- 4:30 p.m.	Round Table by Participating Speakers
		Questions —	Contact Herb Williams, RMGA Office at 571-7300

CONFERENCE REGISTRATION — July 16, 1985, Regency Hotel, Denver

Please make check payable to: Rocky Mountain Gas Association
550 15th Street, Room 400
Denver, CO 80202

No registrations accepted after July 10. Please mail early.

For additional information, contact Herb Williams at (303) 571-7300
571-7300

Fees: Check One

Name _____ \$40 registration fee
Organization _____ \$35 RMGA Member registration fee
Address _____ \$80 registration includes \$45 for an RMGA membership
Telephone _____

LAWRENCE M. ROBERTSON

Continued from page 13

Environmental Design for Public Projects, published by the Colorado State University Press. Consequently, I expressed my appreciation to Professor Birk in a June, 1960, letter read at his retirement.

While I was at CU in 1921, I became a student member of the American Institute of Electrical Engineers. I became a member in 1922, a fellow in 1945, and a life fellow in 1952. I have been very active in this society in offices including chairman of the Denver section, 1942; national Vice President, 1945-1947; national Director, 1956-1960; special national task committee of five founding societies to relocate their headquarters building, and a 14-man committee to merge AIEE with IRE, which ultimately became IEEE.

The last two were very interesting assignments. In 1955, competition was keen between Pittsburgh, New York (the location at that time), Chicago, Philadelphia and Washington, D.C. The societies were Electrical, Mechanical, Civil, Chemical, and Mining. Three members were appointed from each.

The Philadelphia society had been sponsored by the president of the Philadelphia Electric Company but when he died it lost its support. Washington did very little, Chicago's proposal was fair, and New York had been coasting, maybe thinking it would not be moved from its location there. Final selection was a site across the street from the United Nations at 345 East 47th Street, New York, N.Y. The site was best for transportation (air, water and rail), hotels, meeting space and headquarters of advertising agencies since many staff members did not want to move.

The original Headquarters Building was owned by the five founder societies. It was built many years ago at 33 West 39th Street in New York City's garment district and rented space to

other societies. The building was next to the "Engineers Club" and there was no room for expansion. We worked out our suggestions for the New York site and submitted them to the societies. The suggestions were accepted but we had problems obtaining a corner lot on the block. The owner was stubborn, he had a business there and apparently figured that something was going on. At the time former President Hoover was living at the Waldorf Astoria Hotel up the street and we got some help from him and Mayor La Guardia of New York and obtained the property.

I had done some gratuitous teaching of electrical engineering in 1921-1922, 1944-45, 1946-48, and 1950-51 at the University of Colorado; at Denver's Manual High School from 1926-28 and at the University of Denver from 1926-28. There was a very good student at D.U. by the name of La Guardia. I asked if he was related to Mayor La Guardia and he replied, "Yes, that is my uncle." It is a small world.

I also knew R.C. Monteith who was top man at Westinghouse in Pittsburgh. Since he was pushing for a location there, I am sure he did not like our decision. I guess that's the way it goes. Morris D. Hooven (whom I knew very well) was president of AIEE at this time (1955-56). He called me and asked me to serve on the committee, so I said "yes." He didn't tell me that some people were saying, "If five presidents of five engineering societies can't get together, how do you expect fifteen people to get together?" Well, we did.

It was a difficult job to merge AIEE with IRE. A splinter from the group called Power was Radio and they were on their way. In later years they were growing at a rapid rate and the merger meant little to some people. At the time, the argument was that both were electrical and the merger would be stronger. Another argument over the name was

settled by using "Electrical and Electronics." So a whole new organization needed to be worked out, including a constitution, by-laws, officers, directors and an executive director. Don Fink was a member of both groups. He was president of IRE and an officer of Philco-Ford. We had to get Henry Ford to release him if he wanted to go — and on and on - but today IEEE is in business and the largest technical organization in the world with 250,000 members world-wide and it was 100 years old in 1984.

I received a fine 100 Years of IEEE Centennial Medal and a beautiful plaque in 1984 for my activities. These include my lightning investigations in Colorado and the high altitude - 500 Kv test line in Leadville.

In 1963, I had received the William M. Habirshaw Award of IEEE for "vigorous leadership and unique contributions in the field of high voltage transmission, particularly including lightning, corona and radio influence studies at high altitudes and at extra high transmission voltages."

I was a member of numerous technical committees such as: Transmission and Distribution, Power Generation, Switchgear and Electric Machinery. These committees were very valuable and kept me up to date and in contact with the top people in these fields. This is essential in engineering since there are always changes and people discuss problems.

When I was elected IEEE Vice President and Director, I was on the Board of Directors and attended meetings concerning matters of policy, administration and new people in top positions. This also entailed more work because I was assigned to board committees including Planning and Coordination, Edison Medal, Professional Conduct, Transfers, National Publications, Constitution and By-Laws. Other members knew I had a law degree and some of the work was in that line. It was a very interesting and valuable experience.

To be concluded in August issue.

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