MUELLER Record

SPRING/SUMMER 1975

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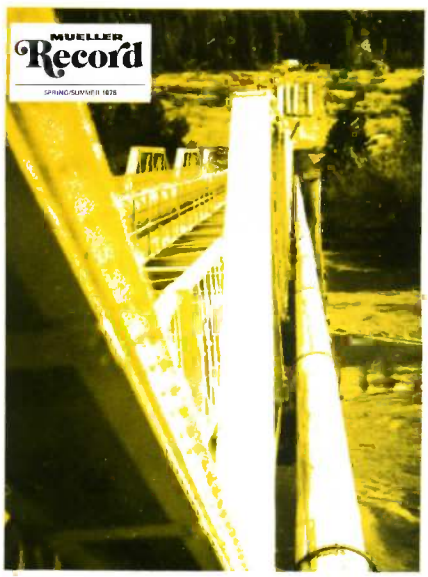


About the Cover:

The Intermountain Gas Co.'s new 19-mile pipeline crosses the Snake River along the side of an existing bridge to carry additional gas supplies into the Twin Falls, Idaho area. See feature starting on the next page.

INTERMOUNTAIN GAS CO. BOISE, IDAHO

Walter Smith, Vice President of IGC, heads the technical areas of the Company. He is a civil engineering graduate of Oregon State University and a graduate of the Stanford Executive Program. He formerly was associated with Boise Water Corporation and was president of that Corporation from 1964 until he joined Intermountain in 1969. While Mr. Smith is not the author of the story below, he was responsible for the Snake River Project, its design and completion.

Total IGC plant additions in 1974 were $11,100,000 which included $4,100,000 for the completion of the LNG plant. The Twin Falls lateral was a substantial investment and a rather complex project. It is a nineteen-mile, ten-inch pipeline extending from the existing Twin Falls gate station north across the Snake River connecting with our existing Sun Valley lateral at a point east and slightly north of Jerome, Idaho. Its construction cost approximately $1¾ million and it was completed in two months time.

The most spectacular feat was boring the Snake River Canyon Wall. This was done to preserve the topography of this area, which is a local scenic attraction. The wall is sheer, solid lava rock, and a 220 foot bore was required to conceal the pipe. The line is invisible at that point, and really--other than at the Snake River crossing and about three irrigation canal crossings--the pipe is buried for its entire length. This was some task, since the Twin Falls area is noted for its concentration of rock.

The pipeline will about double the volume of gas IGC can deliver to the Sun Valley area and it also has some additional value to them. The line provides them with another feed and increases the gas pipeline capacity to the fast-growing area north across the Snake River from Twin Falls; it provides another feed to the north perimeter of Twin Falls, and they will use the pipeline as a "line pack" for gas storage during the wintertime to store about 5,000,000 feet of gas.

As another plus factor, they supplied a gas turbine peak generating facility for Idaho Power Company during the Summer months. This was particularly valuable since this is a low-demand period for IGC.

CROSSING THE SNAKE

Story idea submitted by Walt Arnett, Mueller Co. Sales Representative in Idaho

It takes a lot of skilled people to bring clean dependable gas energy into our homes and businesses. At IGC, and hundreds of other natural gas distribution companies around the nation, they take that job very seriously and they take great pains to see that you get the energy when you want it, where you want it, and as much as you want, all without inconvenience to you in the slightest.

This is a story about how it is done in what IGC calls their Sawtooth Division, administered from their office in Twin Falls, a growing city of 25,000 in South Central Idaho and the challenges they encounter doing their job.

In 1973 it was decided that their service capability to these growing communities of Idaho was beginning to be taxed more heavily than it should, and so they planned to build a second pipeline from the connection with their supplier NORTHWEST PIPELINE. . .across the Snake to a point near Jerome. This second pipe would share the load with the existing line.

In May of 1974 work was begun on the 19 mile extension, which was to encounter almost every kind of obstacle pipeline builders have faced anywhere in the World.

Time was when men built wherever they chose. On the whole, times have changed for the better.

We are all more concerned with the world we must live in than we once were. Thus, the environment and its preservation were of great concern in deciding the route and construction techniques for this pipeline. Of particular concern is the magnificent Snake River Canyon and its wildlife.

The forest. . .the Blue Lakes Area. . .and even the canyon wall

(continued on next page)

itself must not be disturbed.

So it was decided to "bore in" . . .in other words, drill a hole in the solid rock that is the canyon wall so that the pipe cannot be seen at all. Utilizing equipment of the highest accuracy, surveyors plotted the position of the hole, then a specially trained drilling crew from New Mexico was called in to do the job.

The drilling rig was carefully set to the precise latitude and longitude, its tower elevated to exactly thirty degrees, in order to bring the hole out at the base of the canyon wall. The steepness of the canyon is such that the men were working inches from a 175 foot sheer drop to the riverbed below. Buried at both top and bottom, you won't even know the pipe is there.

In these days of new energy development, drilling crews such as these men are in great demand. They came on the Friday before Memorial Day, worked around the clock, day and night for five days, and then left for the next job. . .the fruits of their labors solving a major environmental problem for them.

Scarred Land Restored

At the base of the canyon wall, a pipeline road was built. A temporary scar on the canyon floor was covered and reseeded when they were through, and now grows wild, as though man had not passed.

Here again, skilled operators did the job, disturbing a minimum of ground. The rule was, move just enough rocks and earth to do the job, no more. Somtimes the rocks in the way were bigger than the machines.

The river in such a canyon usually presents the most formidable obstacle of all. . .but in this case someone had been there before to make the job easier.

A bridge, carrying a water main did nicely to carry their pipe across, thus avoiding the hazards of trenching the river. The pipe went through rollers which allowed for expansion as well as making an easy installation.

Across the canyon from the drilling site was Box Canyon.

Here, decisions had to be made about how to do an impossible job. The specification called for thirty inches of cover over the pipe. . .even with a nearly solid rock and rubble topography.

Well, the impossible took a little longer, as they say. The route was selected, and then the rocks were moved where they could be. When they were immovable they went around them. Believe it or not, more than fifty percent was laid in trench; the rest had to be laid on the rock and covered.

Much of the course through this treacherous canyon was "cased," that is a pipe inside a pipe. This provides protection against earthquake and rock slide. . .a couple of likely possibilities here. Because of the slope, erosion could be a problem too. Thus, foam dams and a foam coating was applied on these slopes to retard the erosion after backfilling.

Incidentally, this is private land. Easements had to be secured, and agreements were written that nothing would be done to prevent future use of this land for other purposes. Much of the route is subject to similar agreements.

As you might suspect, laying an underground pipeline is a critical sort of thing. You don't want to be digging it up all the time to make repairs, so the object was to do it right the FIRST time.

No Room for Error

The ten inch line was no exception. The men who performed and supervised the operation were the best in the business. They had a watchful eye. . .and a high degree of skill. The company inspectors who followed the supervisors were also highly skilled. Between the two, little was overlooked. There was no room for error.

The pipe itself came wrapped. The wrap provides protection against the years it will be underground, and mother earth has her own way of attacking man-made objects.

First, the joints were welded . . .sometimes in strings a mile or more long.

Then, the weld was x-rayed; assurance the weld is physically strong and leak proof. If everything was okay, the joint was then wrapped in like fashion to the pipe. . .so no metal is exposed to the soil.

Even the wrapping was inspected. A device was pushed along the pipe by a technician to detect any flaw in the wrap. . . and made a noise. . .to tell them there was a flaw. The process is called "jeeping". . .and they pushed that little device up and down the canyon wall, across the river and the desert; every inch of pipe that was used and each flaw was rewrapped on the spot.

Except for the rocks. . .except for the rivers. . .except for the highways and for the irrigation canals, which are the very life blood of Idaho, trenching for the pipeline was easy.

Moving a day or two ahead of the pipe crew, this machine made an absolutely flawless trench the proper width and depth, and moved some quackgrass too. It made the job look like a cinch.

But soon enough one of the obstacles we mentioned turned up. . .either natural, or man-made, such as highways and railroads.

Tunnels Under Obstacles

A new crew and machine was brought into play to solve such problems. Once again called boring, this machine used an auger together with a casing pipe to drill horizontally under the obstacle, in this case, the highway; and when the auger was removed the casing was left to provide a tunnel for the pipe to pass through. In this manner, they crossed Interstate 80, three tracks of the Union Pacific Railroad and a couple of irrigation canals.

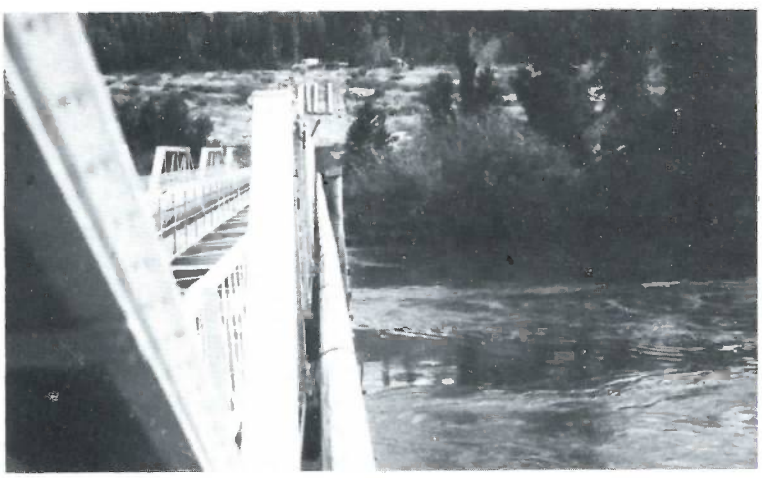
The flow of gas is monitored from the station. Valves and other devices at the terminals will be remote controlled, as well as having a local control capability. The valving, associated pipe and all connections were fabricated to minute tolerances in advance, rigorously tested and finally installed. All this work for a "backup system" pipeline? You bet. In the Gas business, nothing should go wrong.

At last came the backfilling. For sixty days, these men had participated in one of the most exacting of engineering projects. With just the detail described here you can imagine what the

builders of the Alaska Pipeline are going through. . .where, in addition to hostile terrain, freezing cold is a factor, too.

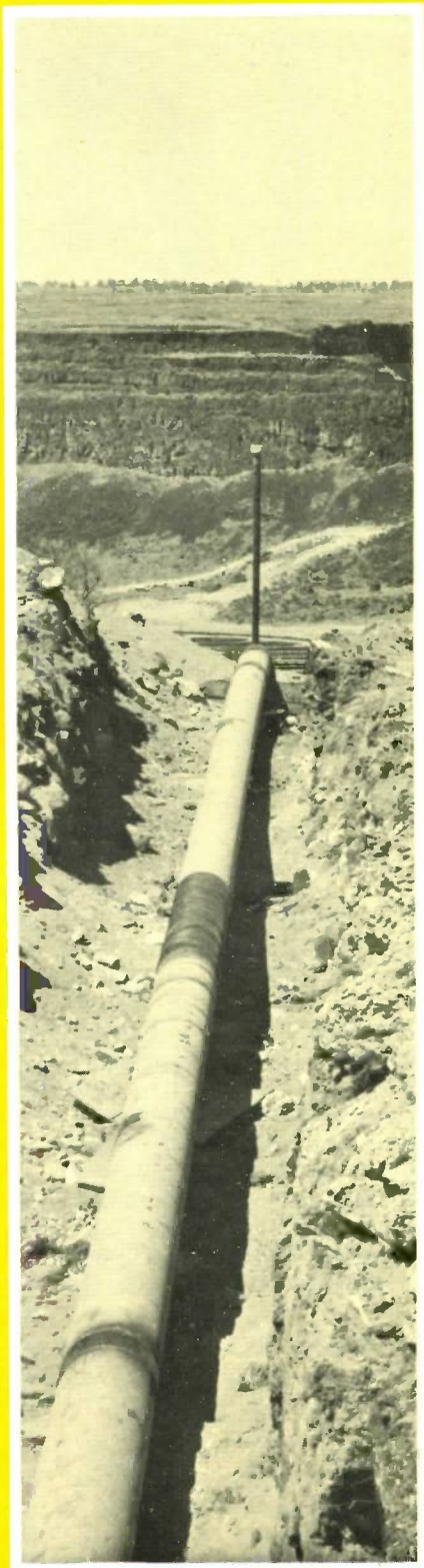
In the Northwest they have the good fortune to have enough gas for everyone's need. That is one reason why they are building additions to that system like this one. They are determined to see that their customers will have the best of all fuels for as long as they want it. □

This is a panoramic view of the Snake River Canyon. In the foreground is the Perrine Memorial highway bridge at Twin Falls, Idaho. In the background can be seen the bridge carrying the Twin Falls lateral pipeline described in this story.

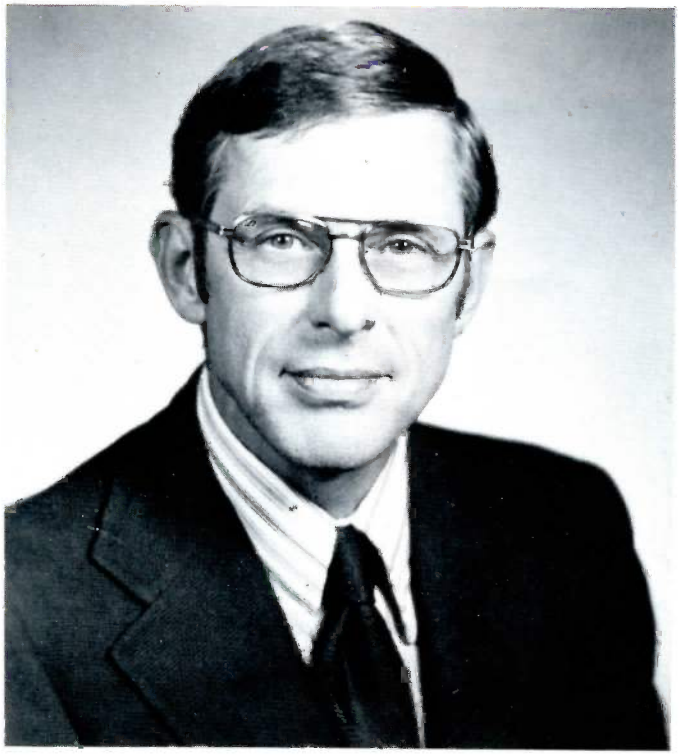


(Above) This is a close up of IGC's pipeline crossing the Snake River installed on the side of an existing bridge primarily used to carry a water main to the Twin Falls area.

(Right) Here is the new IGC pipeline being layed on the south rim of the Snake River Canyon. In the background is the solid lava rock canyon wall through which a 220 foot vertical bore was made to conceal the pipeline for environmental purposes.



"It's My Pleasure to Welcome All of You . . ."



It's my pleasure to welcome all of you to the Twin Cities of Minneapolis and St. Paul. Possibly, it would be more accurate if I were to welcome you to Metro Minnesota. There are some who say that we should be looked upon as the tri-cities of Minnesota, due to the rapid expansion and growth in the area south of Minneapolis, in the vicinity of our airport in which my hometown, Bloomington, the Home of the Vikings, is now the fourth largest city in the state, close on the heels of Duluth.

Our population in the Twin Cities Metropolitan Area is slightly over two million people, about half the population of the state. We are the 17th largest metropolitan area in the United States and, in the last century, had the third largest growth rate of large metropolitan areas. The people here are reasonably prosperous, with a median income of approximately $10,000 per family. They are well educated: 92% of those young people who enter the 9th grade graduate from high school. This is the highest in the nation and compares to a national average of about 79%. Minneapolis is the home of the University of Minnesota, one of the largest land grant universities in the United States, with about 60,000 students on the Twin Cities campus.

Minneapolis is the home of the Ninth District Federal Reserve Bank, which recently moved into a very unique new building at the foot of the Nicollet Mall. This bank serves the states of Minnesota, Montana, North and South Dakota, part of Western Wisconsin and the upper peninsula of Michigan. The Twin Cities Metropolitan Area has over 125 banks and savings & loan associations, with total resources in excess of 7½ billion dollars. There are 28 large insurance companies based here with insurace in force of over 30 billion dollars. A few of the larger corporations headquartered here in the Twin Cities are: Honeywell, 3-M, Control Data, The Univac Division of Sperry Rand, General Mills, the Pillsbury Company, Burlington Northern Railroad and Northwest Airlines. The Twin Cities are also the international headquarters of two major Christian organizations: the Billy Graham Evangelistic Association and The American Lutheran Church.

A 1972 Citizens League analysis rated the Twin Cities Metropolitan Area tops in the nation as far as quality of life is concerned. This rating was based on indicators such as: employment, income, housing, mental health, community concern, educational attainment and air quality. We ranked second among the nation's top 17 metropolitan areas in air quality, thanks to a better than 90% natural gas heating saturation. Listen to what we have to offer: 936 scenic lakes; 513 parks; 39 playhouses, including the world famous Tyrone Guthrie Theater; 53 camping areas; 372 hotels, motels and resorts; 85 movie theatres; 61 marinas and 155 boat launching sites; 3,523 restaurants and 124 night clubs; 27 ski areas; 10 major museums and over 50 historical points of interest; two downtowns; 33 major shopping centers and thousands of stores and shops; major league sports featuring the Twins, Vikings, North Stars, Fighting Saints, and Big Ten sports with the University of Minnesota; 22 colleges and universities; 50 art galleries, including 13 fine arts museums and institutes; 438 tennis courts; 148 beaches and pools; 116 bowling alleys and archery ranges; the Minneapolis Aquatennial in the summer and the St. Paul Winter Carnival in the winter; and dozens of annual festivals, all

EDITORS NOTE: We feel that we should share with you one of the finest examples of a welcoming speech that is truly interesting and informative. This speech was delivered at the 1974 AGA Distribution Conference not by a Mayor or Public Official, but "one of our own," H.E. Quist Jr., President of the Midwest Gas Association. (Shown above)

This is a panoramic view of the Twin Cities, Minneapolis and St. Paul, the subject of H.E. Quist's welcoming speech.

within the metro area of Minneapolis-St. Paul.

I think possibly the most significant statistic that you will all understand is the fact that the Twin Cities are the coldest major metropolitan area in the U.S. Our annual degree day deficiencies have ranged a low of 6922 in 1941-42 to a high of 9066 in 1935-36. The average degree day deficiency for the last 30 years is 8153 degree days. That kind of weather takes a lot of gas.

As a result of these frigid conditions the Twin Cities has a unique system of what we call "skyways," so that on December 31, 1973, when the average temperature was -17°F, Claudia, the cute young teller at the First National Bank, remembered she had to go to Dayton's on her lunch hour to pick up a gift for her mother. Did she need overcoat, scarf, hat, gloves and galoshes? No. Claudia went off on her chore wearing the same outfit she wore on the job. Fortunately, downtown Minneapolis is, to a considerable extent, now served by the skyway system of enclosed pedestrian ramps that link buildings at second-story levels, in heated or air-conditioned comfort, depending on the season. Claudia could travel the four blocks to Dayton's without braving the elements. The skyways contribute to making girl-watching a year-'round pastime.

I am sure you all noticed, riding in from the airport, that Minneapolis has finally gone modern with a 57 story building, the I.D.S. Tower, home of another national firm called Investors Diversified Services. Visit the Crystal Court, a part of this building; it's outstanding.

On behalf of the Midwest Gas Association and its local member gas utilities, the North Central Public Service Company, the People's Division of Northern Natural Gas Company, the Gas Division of Northern States Power Company, the Minnesota Natural Gas Company, and the Minneapolis Gas Company, it's a great pleasure for me to again welcome you to Minneapolis. Incidentally, the stockholders of Minnesota Natural and Minneapolis Gas are meeting today to make the final decision on a merger of the two companies. We expect to be known as the Minnesota Gas Company - "Minnegasco" - on Friday of this week. Please relax and enjoy our great towns. □

From main to meter: value all the way

Value is the something extra you get from Mueller.

Every Mueller product is engineered and manufactured under the most rigid quality controls to insure efficient performance and dependability. The value is long range economy and peace-of-mind for you.

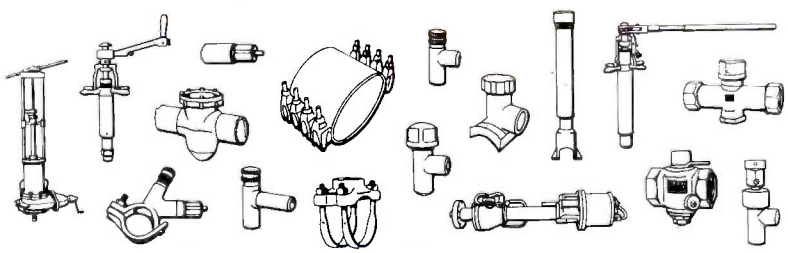
Every Mueller method is designed to combine with Mueller products to give you total system compatibility, to make your work fast, easy and simple. The value: time and labor savings, a more profitable job for you.

Every Mueller Representative is factory-trained to give you complete sales-service coverage. He's one of 49 specialists, backed by seven District Managers, a large staff of engineering and sales-service personnel and five plants strategically located throughout the nation. They all can provide you with technical assistance and information on very short notice. Your extra value is added "know-how" for every job, without extra cost to you.

Add up the value you get from Mueller when you start planning your next job. You'll see what we mean when we say—

MUELLER® means more for your money

GC-360



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serving the water and gas industries since 1857

GED GENERAL EQUIPMENT DIVISION GAMA INDUSTRIES

Engineering Report

Mueller Co.'s Research and Development Facilities

Carl E. Floren - Technical Director of MUELLER CO. Engineering Division and author of this report.

No matter how well you make a product someone or some element seems to figure out a way to bend it, burst it, break it, smash it, freeze it, overheat it or in some other ingenious way damage it beyond repair or at least to a point where it won't operate at full capacity. This is what makes salesmen and servicemen gray . . .and keeps engineering and research departments working overtime trying to keep ahead.

At MUELLER CO. we have an engineering/research staff plus a full range testing laboratory which works full time testing our products to meet every conceivable demand of strength, performance and/or safety that might be found in the field.

We feel our customers want and expect this. Of course it costs a little more but the results are justifiable. . .the field performance of our products proves this. Still we find that perfection is a difficult goal to achieve. So if you say to yourself, "Yes, but I remember that MUELLER. . .Meter Valve I had a problem with in 1956," you are probably right. But if you let us know what happened, and we hope you did, you can be assured that this important piece of intelligence went to our engineering/research department, and it became the cause. . .or part of the cause. . . for a new round of tests on that particular product under the conditions that made it fail. In other words, at MUELLER we test thoroughly before the products go out into service. We use the feed back we get from the field. Suggestions, ideas, from actual operating personnel are carefully considered for they are the people who use and know our products (sometimes as well as we do). Many times this input enables us to incorporate new improvements that make these products work even better and longer.

There are actually two types of products with which a gas distribution company is concerned. The first include widely used every day products covered by standards like the conventional tees, elbows and pipe caps. These have been in use literally for generations. They are so universally used that national standards have been written explicitly detailing size and performance requirements.

The second type, and these are the type we are most interested in here, are the special purpose (designed for a particular use) products. These items may be available from more than one source. If they are, they likely differ in design and performance. The reason for this is that each manufacturer has his own testing procedures for developing and improving these products. These procedures have evolved over the years by demand of the user for greater safety and improved performance in an industry where both are of the utmost importance.

But let's get back to conventional tees, elbows and pipe caps for a moment. These fittings. . .or their aunts and uncles were in use well before there really was a gas distribution industry. They were being used to carry water or air or sometimes low pressure illuminating gas. They proved themselves by lasting for a long time on the job. At the time there was no real hazard or economic loss if a fracture occurred. However, it became obvious that hazards of leaking gas and broken pipelines were vitally important as gas distribution systems were developed. Field evaluation was no longer adequate. As more and more products were developed methods had to be devised so that new products could be produced and put on the market with the assurance that they would perform initially to the full safety and dependability standards demanded in the field.

Thus evolved the development engineer, the research department and of course the highly sophisticated testing laboratories such as that found at MUELLER CO. The development people had to prove to themselves. . .and their supe-

riors. . .that before it left the company the product would work once, twice or a thousand times if that was what was required in the field. But this was done in the test labs. . .not the field. Through testing, the engineer could spot most failures and then assign a cause to them so that future failures could be eliminated. In other words, engineering/research department's goal was to prove that the new product had a capability of lasting the 40 or more years expected by the customer without having to wait 40 years to prove it. This is the explanation why test labs grew and grew and grew. It's the test lab where a new product is conceived, gestated, born and reared into full manhood (or personhood if you prefer) before it gets out to capably perform its job. And it also acts as the school for higher product education since the testing doesn't stop once the product is out in the field. Complete perfection is said to be the only satisfaction of the engineer. And thanks to sophisticated testing facilities such as MUELLER CO. has, gas distribution products are better.

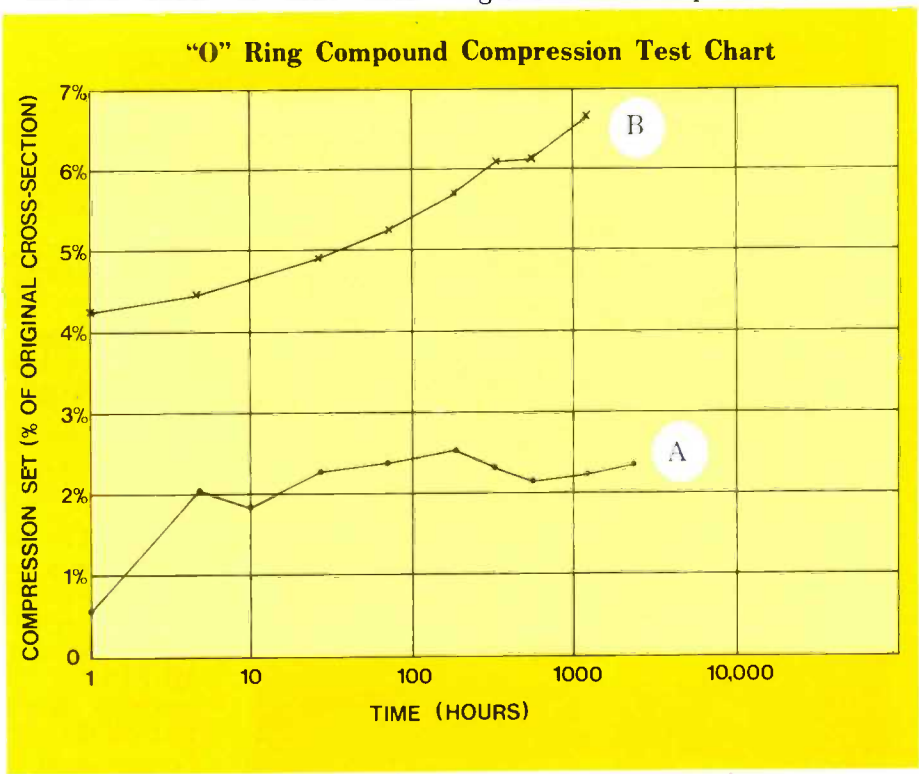
So with that background let's now look at what we at MUELLER CO. look at in our testing program: Generally there are quick term tests and there are long term tests. The quick term tests almost always push the product to the point of failure. This is generally to measure immediate strength of the part. For instance, at MUELLER CO. we put a product through one or more of the following quick term tests: tensile, bending, torsion, pressure burst, impact, heat, freeze, humidity. We analyze stress, metallurgical structure, leak and surface integrity.

As for long term testing, MUELLER engineers use sustained pressure tests, deadweight tests and corrosion tests to evaluate possible effects of time. With these tests the part may ultimately fail, but only after it has been observed under certain load factors for long lengths of time. . .far longer than the product is expected to perform in the field under similar load conditions.

Now let's take a "for instance." A very useful way of demonstrating useful life is to start out with tests on standard fittings. . .an elbow, a tee, a pipe cap or a standard compression fitting. These standard items have already demonstrated their full performance qualities by the best of all tests. . .in actual use. . .and, for several decades. If the development engineer can determine tests to cause these standards to fail under simulated "normal" conditions, he has a yardstick with which to measure a newer product. At MUELLER CO. we feel we have utilized this procedure to advantage in the development of fittings using resilient seals or compression joints.

An example is the "O" Rings used by MUELLER. The "O" Ring has limitations--one of which is high temperatures. Consequently the life of an "O" ring can be determined by its measuring response to temperature. The compression set test is a simple lab test that is generally run in less than a week's time. This test duplicates one in which time in use can be simulated to cause elastomeric seals to lose their effectiveness. . .in performing a compression set test--the "O" rings are first measured. Then they are put under a known compression load and stored in an oven at a known temperature for a selected time. At the end of this time they are removed, cooled, the load is removed and they are remeasured. The difference in dimension indicates rubber quality. . .or the ability to perform. At MUELLER CO. we often perform this test as an incoming inspection test on "O" rings. . .testing at 257°F for 70 hours. It was a simple matter to place the "O" rings in actual parts and to monitor performance with extended periods of time. Such a modified test was particularly important when MUELLER CO. was considering using "O" ring compounds from two different companies. The results of a series of tests for loss of squeeze of two different compounds from two manufacturers are plotted in the chart shown below. It isn't too difficult to see why MUELLER CO. selected Compound A.

This is just one of hundreds of tests which are underway constantly at MUELLER CO. to seek new ways to improve quality and safety of our line of gas distribution products.



Let's take a look at a few of these tests in the following photos:

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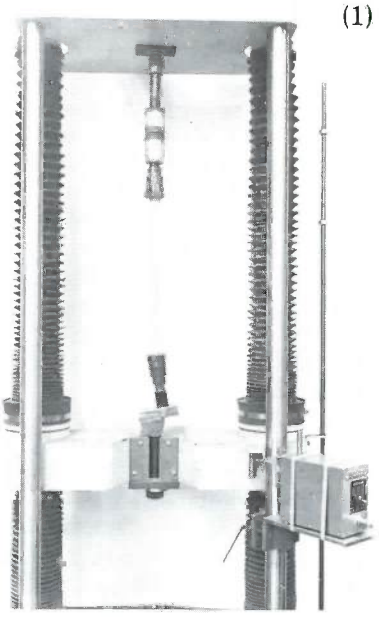

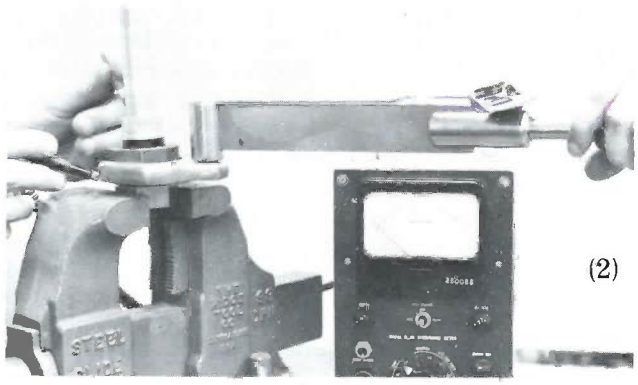

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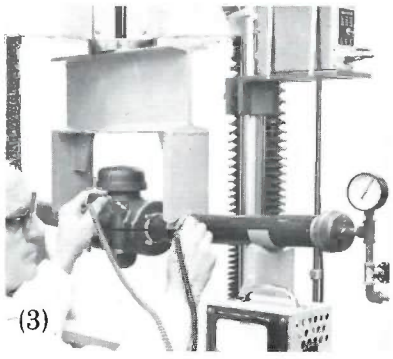

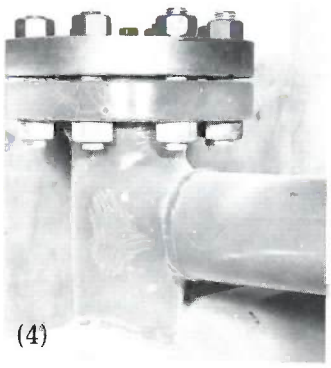

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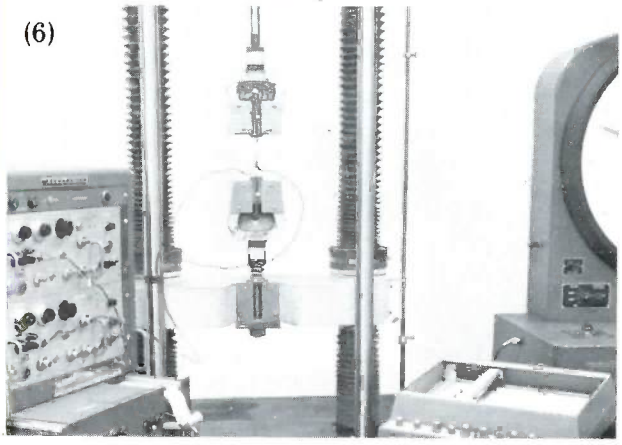

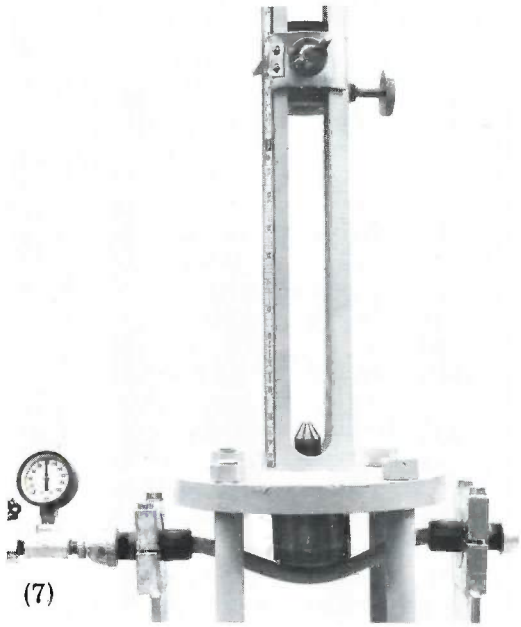

(7)

(1) The gas industry has an understandable desire for a pipe connection that has a low field assembly cost combined with a capability to withstand external loading. . .such as ground temperature changes, dirt settling or an errant back-hoe. So MUELLER CO. has a special tensile testing machine shown here performing an offset tensile test on plastic pipe joined with MUELLER 112® Compression Connections.

(2) How many times has it been said by an overzealous installer, "Tighten it up and then give it one more turn!"? As a result, MUELLER CO. engineers run this test to evaluate the capability of a MUELLER Insulating Union to withstand excessive tightening loads.

(3) Bending tests are used to evaluate possible effects of external piping loads on an insulated sleeve to determine the load required to fail an electrical insulating fitting.

(4) Stresscoat brittle lacquer is used to determine areas of high stress. The direction of the principle stress is shown by the crack patterns that develop under special testing. Strain gauges are then used to help determine the actual strain produced under various loads.

(5) The MUELLER CO. pressure burst test determines the ultimate in a fitting's ability to withstand pressure. This fitting burst at 6250 PSIG. . .a far greater pressure than ordinarily found in gas distribution lines. The strain gauges furnish information on strain which is of vital use when determining the pressure rating.

(6) To follow up further a test bar is taken from the fitting shown in Figure 5 and tested to evaluate stress-strain properties. This information attenuates the actual burst data to estimate the strength of a fitting at its minimum state.

(7) What happens when the first shovel of dirt is thrown into the ditch on top of the pipe next to a compression fitting. . .or when a backhoe dumps a bucket of sand on a fitting? MUELLER knows before it happens, thanks to this impact testing device.

(8 & 9) Most gas distribution products must be capable of performing through a temperature range of -20°F to +150°F. On the hot side (no. 8) a lab technician checks the leak resisting qualities of a MUELLER H-11175 LUBOSEAL® Gas Meter Valve at +150°F. The chilly looking fellow on the right is all bundled up to evaluate a MUELLER gas valve's ability to withstand leakage at -20°F. . .all in a day's work in the MUELLER CO. test lab.

(10) Humidity is one factor in the environment which can be isolated in the lab and evaluated by itself or in combination with temperature. Here the insulating union from a MUELLER H-11174 LUBOSEAL® Gas Meter Valve is being subjected to a humidity/temperature test. The results: maintenance of insulating ability under these adverse conditions.

(11) Since abnormal metallurgical structures may be a cause of a malfunction, periodically our lab technicians take a sample, polish it, mildly etch it and then magnify it for observation. That's what you see here. . .cast iron magnified 100 times. This has saved many a headache for an installer even though he would not be aware of it.

(continued on next page)


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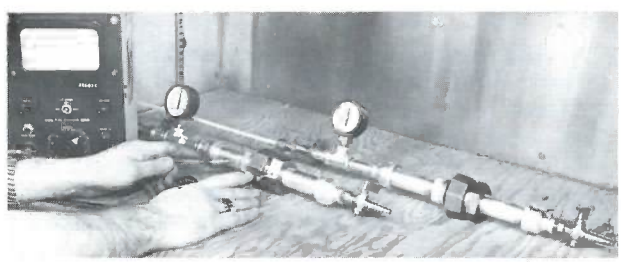

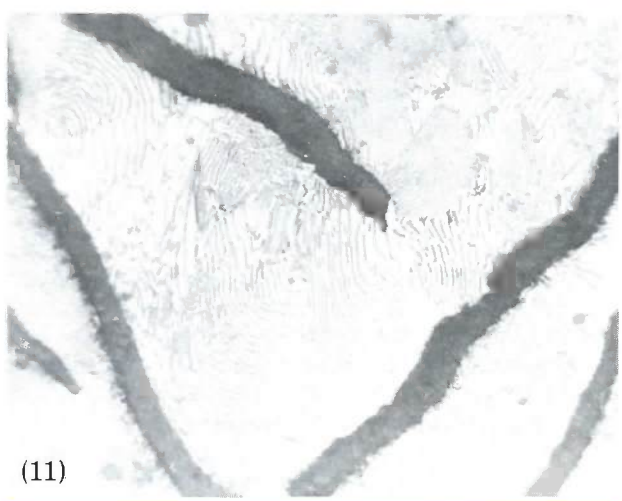
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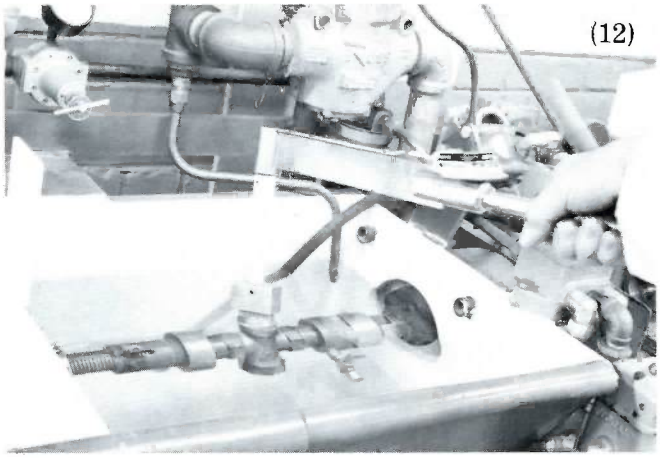

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(12) Specially designed tanks are used both in the test lab and on the production line to evaluate the leak sealing capability of valves and fittings such as this MUELLER H-11103 Inverted Curb Valve being tested by water submersion at 125 PSIG. It's this double barreled testing that keeps a product working longer.

(13) Precision surface tracing equipment makes highly magnified profiles of valve seating surfaces to determine the possibility of leaks. Parts that must match can be controlled to tenths of a thousandth of an inch. This requires high precision manufacturing capability and unique control methods to achieve the quality goals we are after.

(14) Sustained pressure tests such as this evaluate the performance of MUELLER 110® Compression Connections on polyethylene pipe. These polyethylene plastic pipes were manufactured by many different companies.

(15) Ground temperature changes or earth settlement may pull a pipe out of a fitting. These forces are simulated in this dead weight test.

(16) What corrosive damage is done to various MUELLER products when they are buried in various types of soil? One way MUELLER CO. engineers find out is to put them for sustained periods in such corrosive soil as this "Caliche" which we imported from Arizona.

(17) Most of MUELLER CO.'s product testing is performed within a laboratory under controlled conditions. But to see how products react under the exact condition of an installation, MUELLER CO. has this outdoor test station in which hundreds of MUELLER valves and fittings are tested above and below ground, under various pressure loads and for extended periods of time. Passing these tests with flying colors provides further assurance that they are ready for anything that will come up in actual field conditions. □

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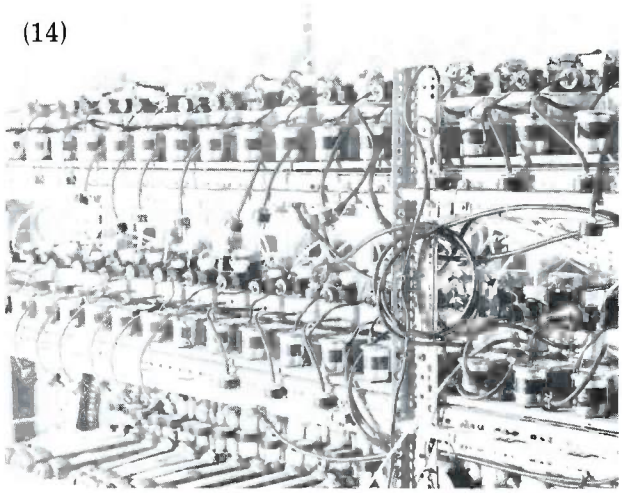

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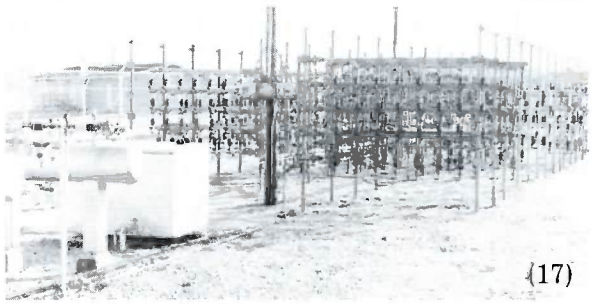

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In Memoriam

Albert G. Webber, Jr.

John F. Thurston

With deepest regret we report that two former Mueller Co. presidents died last fall within just a few weeks of each other. Albert G. Webber Jr. died in Decatur on September 25 after a brief illness. He was retired president and chairman of the board. John Thurston died suddenly on October 15. He had retired in January of 1973 from his position as Mueller's president and chief executive officer.

Mr. Webber was a senior partner in the Decatur law firm of Webber, Welsh, Kehart and Shafter. He graduated from the Universiy of Illinois College of Law in 1917 and was admitted to the bar that year. Mr. Webber practiced law in Decatur since 1919.

He became general counsel for Mueller Co. in 1936. He was the firm's president and chief executive officer from 1947 to 1963 and chairman of the board of directors from 1963 to 1971. In addition, he was a director of Mueller Ltd., in Sarnia, Ontario for many years.

Mr. Webber served in the Navy in World War I and was chairman of the Advisory Council on Naval Affairs in Decatur. He was a director of Decatur Memorial Hospital from 1956 to 1965, and was a member of many business, professional, and social organizations, including the Illinios State and American Bar Association, and Delta Sigma Phi fraternity.

John Thurston came to Decatur and Mueller Co. as president and chief executive officer on May 1, 1963, succeeding Mr. Webber. Prior to his coming to Mueller he was senior vice president of General Dynamics Corporation, and president of the Liquid Carbonic Division of that company. He joined General Dynamics in 1955, was appointed a corporate vice president in 1957 and became vice-president - special projects in 1960. Prior to his association with General Dynamics, he was a merchandising manager at Thompson Products (now TRW, Inc.) in Cleveland, Ohio.

Mr. Thurston served as a civilian consultant to the Secretary of the Army on military parts supply problems in the U.S., Japan and Korea in the 1950's for which he was awarded the Army's Exceptional Civilian Service decoration. In World War II he served in the Air Force and was discharged as major.

He was born in Denver, Colorado and graduated from Colorado College in Colorado Springs in 1931.

Mr. Thurston served as a member and as chairman of the board of trustees of Millikin University in Decatur, and as a consultant to Millikin in various capacities. He was a former member of the advisory board of St. Mary's Hospital in Decatur. Other community services he performed included work with the Decatur Memorial Hospital's expansion fund drive and membership of the board of the Decatur Chamber of Commerce. He was an elder of the Westminster Presbyterian Church and an active alumni member of Kappa Sigma fraternity.

MUELLER NEWS

THE MUELLER CO. BOARD OF DIRECTORS

(Seated from Left to Right) Harlan A. White, Bessie I. Mueller, Lenore Mueller Schmick, Frank H. Mueller, Robert V. Krikorian, Adolph Mueller II, A.E. Staley III. (Standing from Left to Right) Dudley J. Godfrey, Jr., John A. Schluter, William E. Murphy, John S. Mueller, Philip M. Mueller. Adolph Mueller II, A.E. Staley III, John A. Schluter, John S. Mueller, and Philip M. Mueller are the Great-Grandsons of the Founder of MUELLER CO.

MUELLER CO. RE-ELECTS BOARD OF DIRECTORS AND OFFICERS

At the annual meeting of the shareholders of MUELLER CO. Mr. John S. Mueller, business consultant, was elected to fill a vacancy which existed on the Board of Directors. Others re-elected to the board were Dudley J. Godfrey, Jr., Robert V. Krikorian, Adolph Mueller II, Mrs. Bessie I. Mueller, Frank H. Mueller, Philip M. Mueller, William E. Murphy, John A. Schluter, Mrs. Lenore Mueller Schmick, A.E. Staley III, and Harlan A. White.

John S. Mueller is a graduate of Michigan State University and attended law school at Hastings in San Francisco. His business consulting firm is located in Tiburon, California.

The following MUELLER CO. officers were elected at the Board of Directors meeting which immediately followed the annual meeting of shareholders:

Frank H. Mueller	Chairman of the Board
Harlan A. White	President and Chief Executive Officer
William E. Murphy	Executive Vice President
W.R. Leopold	Vice President-Operations
Charles W. Moore	Vice President - Manufacturing
Robert W. Mallow	Secretary-Treasurer
Dan L. Carlson	Assistant Secretary

MUELLER LIMITED ELECTS DIRECTORS AND OFFICERS

Members of the Board of Directors of Mueller, Limited, Sarnia, Ontario, who were elected at the shareholder's annual meeting are C.S. Browett, Harry J. Dowding, W.R. Leopold, George McAvity, Frank H. Mueller, R.M. Nicolson, and Harlan A. White. W.R. Leopold, Vice President-Operations, for the parent MUELLER CO., was elected to fill the vacancy created by the retirement of L.R. Huff.

The following officers were elected following the shareholder's meeting:

Harlan A. White	Chairman of the Board
George McAvity	President and Chief Executive Officer
R.M. Nicolson	Vice President
Harry J. Dowding	Manufacturing Manager
C.S. Browett	Secretary-Treasurer
Kenneth Romphf	Asst. Secretary-Treasurer

LEOPOLD

W.R. LEOPOLD

W.R. Leopold was elected to the newly created officer position of Vice President-Operations by the Mueller Co. Board of Directors at the company's annual meeting held in Decatur on February 13. Leopold previously held the position of Vice President-Engineering.

In his new position as Vice President-Operations, Mr. Leopold will have overall responsibility for all engineering and manufacturing operations of the U.S. plants. In addition, he will exercise general supervision over the Company's Canadian subsidiary, Mueller, Limited.

Leopold joined Mueller Co. in 1956, coming to Decatur from Stratford, Conn. where he was senior engineer--special projects for Lycoming Division of AVCO.

He is originally from Newark, N.J., and received his Bachelor of Science degree in Mechanical Engineering from the Illinois Institute of Technology, Chicago, and a Master of Science degree in Mechanical Engineering from Stevens Institute of Technology, Hoboken, N.J. He was named a Fellow by the American Society of Mechanical Engineers in 1972, and received the Edwin Church award in 1973 for his work in engineering education. Also in 1973, he was made an honorary member of Pi Tau Sigma, a national engineering honorary fraternity at the University of Illinois, and an Eminent Member of Tau Beta Pi, a national honorary science fraternity at Rose-Hulman Institute.

MALLOW

ROBERT W. MALLOW

Robert W. Mallow, assistant secretary and budget director, has become Secretary-Treasurer.

Mallow joined MUELLER CO. in 1956 as an internal auditor. In 1958 he was promoted to plant controller, in 1959 was promoted to budget director and was elected assistant secretary in 1970. He is a native of Urbana, Illinois and a graduate of the University of Illinois.

He was associated with the accounting firm of Gauger and Diehl before joining MUELLER CO.

Mallow has been active in community programs, serving on the city council and the budget committee of the Decatur and Macon County United Fund.

CARLSON

DAN L. CARLSON

Dan L. Carlson, internal auditor at Mueller Co. since 1972, has been promoted to the position of general controller and assistant secretary, reporting to the president.

Carlson, a native of Galesburg, Illinois, graduated from the University of Iowa and is a certified public accountant. Prior to joining Mueller Co. he was with Hyster Company serving as budget and cost supervisor, plant controller and was corporate cost accounting director for world wide operations at the home office in Portland, Oregon.

HUFF

LYLE R. HUFF

Lyle R. Huff, vice president and secretary-treasurer, retired from MUELLER CO. on January 31, 1975. At that time Lyle had completed almost 25 years of service with the company in the Financial Division.

He was elected to the Board of Directors of MUELLER, LIMITED, Sarnia, Ontario in 1962, and a vice president of MUELLER CO. in 1965.

Before coming to MUELLER CO. he was an auditor for Phillips Petroleum Company, an instructor in accounting and business law at the University of Illinois, and a member of the staff of the accounting firm of Gauger and Diehl.

GROSBOLL

LORIN E. GROSBOLL

On October 22 Lorin E. Grosboll retired from his position as a Sales Representative for MUELLER CO. in the state of North Carolina. Lorin completed almost 38 years of service with MUELLER CO. From 1948 until 1970 he was our Sales Representative in both North and South Carolina.

On behalf of Lorin, we would like to express his appreciation for your loyalty and friendship during these years, and we are sure you will join us in wishing him a full measure of good health and happiness.

C. ROBERT FISHER

FISHER

C. Robert Fisher has been appointed a Sales Representative for MUELLER CO. in the state of North Carolina. He succeeds Lorin E. Grosboll.

In 1969, Bob joined MUELLER CO. as a Sales Trainee. After completing an intensive sales training program in 1970, he was appointed a Sales Representative in our Southeastern Sales District. He has served in that capacity for the past three and one half years working with both the water and gas industries in South Carolina.

His headquarters will be Charlotte, North Carolina.

ROBERT F. MAXWELL

MAXWELL

Robert F. Maxwell has been appointed Sales Representative for MUELLER CO. in the state of South Carolina. He succeeds C. Robert Fisher who has been transferred to North Carolina. A native of Decatur, Illinois, Bob joined MUELLER CO. in 1961. Since that time, he has worked in the factory, Decatur Sales Office, Advertising and Sales Promotion Department, and in Sales Headquarters. After being selected as a Sales Trainee, Bob has completed an intensive sales training program. This program, combined with his previous experience, has given him a thorough knowledge of products for both the water and gas industries.

His headquarters will be West Columbia, South Carolina.

JAMES P. KOLLOCK

KOLLOCK

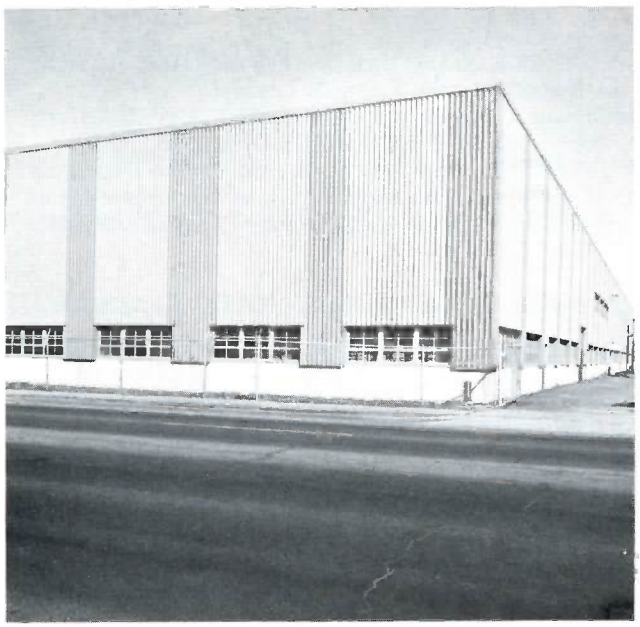
James P. Kollock has been appointed Sales Representative for MUELLER CO. in the state of Oklahoma.

A native of Decatur, Illinois, Jim is a graduate of Eastern Illinois University with a Bachelor of Science degree in Marketing and Management. In 1973, Jim joined Mueller Co. as a sales trainee. Since that time, he has been in an intensive training program where he has gained a thorough knowledge of products for both the water and gas industries.

His headquarters will be Oklahoma City.

FOUNDRY EXPANSION

Expansion of the Foundry facilities at Decatur has been completed. On the East side of the foundry a 480' long by 70' wide addition has added over 44,000 sq. ft. of foundry area including a new Shipping and Receiving Dock at the North end of the addition.



East side of Decatur foundry.

New shipping and receiving dock.

When a Texas school class was told that the next day they would learn to draw, 18 youngsters showed up with pistols.

And then there was the new bride who went through 6 boxes of cake mix trying to concoct a birthday cake for her husband. Every time she put the cake in the oven, the candles would melt.

off the Record

The cart in the supermarket is the most expensively run vehicle in the world.

Bride: We're out of ice cubes.
Groom: How come? Did you lose the recipe?

One problem of retirement: You have more time to read what your problems are.

A heavy drinker was warned by his doctor that he was suffering from too much water in his body. "That's impossible," said a close buddy, "you don't drink any water - all you drink is booze."
"I know," said the tippler. "It must be those darned ice cubes."

To make a long story short, there's nothing like the boss walking in.

An adult is a man who has stopped growing at both ends, but not in the middle.

Weather forecasting has been speeded up but it is still several hours behind arthritis.

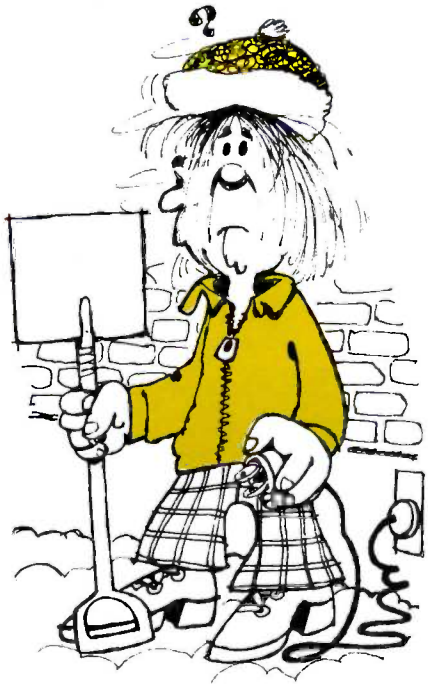
Send your oil driller a "get-well" card today.

"What do you get when you cross a rooster with a gorilla?"
"I don't know but when it wakes you up in the morning, you'd better get up."

Hard work will never hurt you, unless it's the hard work of your competitor.

A man is known by the company he thinks nobody knows he's keeping.

Japan has solved its energy crisis. It is going to import 200 billion tons of sand from Saudi Arabia and drill for its own oil.



Father: "Grab a snow shovel and give me a hand."
Teenage son: "Okay, but where do I plug it in?"

America has oil wells that are untapped and phones that are.

After buying a $50,000 insurance policy before a plane trip, a salesman stepped on a nearby scale. Out came one of those fortune-telling cards. It read: "A recent investment may pay big dividends."

With corruption in government, crime, inflation, kidnappings, skyjackings, shortages, etc., it was much more peaceful when we were at war.

Last Feb. 13, a divorce lawyer in Miami sent out 2500 Valentines to businessmen dipped in French perfume and signed, "Guess who?"

The best way for a man to avoid getting up in the morning with a grouch, is to get up before she does.

What's wrong with working for chicken feed? Today it's worth $14 a bushel.

If you think there's no one who cares if you're alive, don't file your income tax and see what happens.

All work and no play makes Jack a favorite with the IRS.

Why do those sheiks need all that oil money? It's 95 degrees there most of the time and their wives wouldn't know what to do with a fur coat.

Steno: "Why did you give up your water bed?"
Typist: "Harold and I were drifting apart."

It is selling that makes the world go round. Not love. Love just keeps it populated.

Where there's smoke, there's too much energy being wasted.

UNSYMPATHETIC MANAGER
The Yankees once had a rookie who was having a lot of trouble handling fly balls. At the end of one inning in which he had flubbed a couple of flies, the rookie said to Casey Stengel, "Those cross winds are really giving me trouble." "Son," said Stengel, "those aren't cross winds, those are trade winds - and you're going to be traded by nightfall."

MUELLER CO., DECATUR, ILLINOIS

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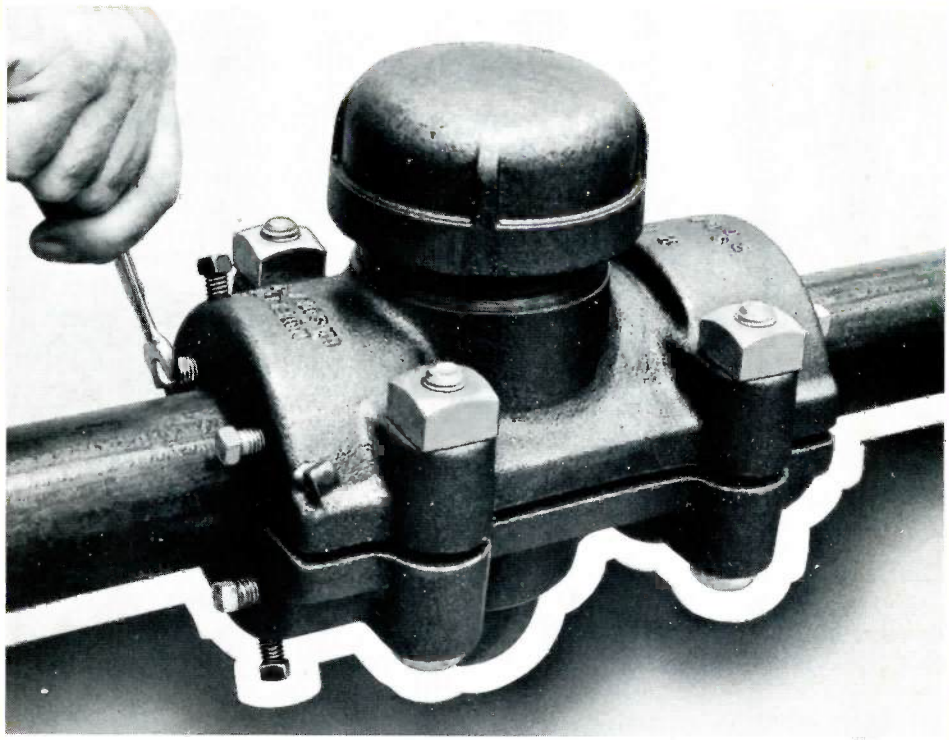

Isolate mains where needed for efficient cathodic protection— provide for future stop-offs at the same time!

The MUELLER® H-17166 Mechanical Joint Insulated Line Stopper Fitting provides a quick, easy way to isolate a section of main so it may be cathodically protected. Simply bolt the fitting on the main and *use your existing MUELLER Drilling Equipment to drill out the main* under pressure with no leakage and no gas flow interruption.

Not only is the main section isolated, you have provided for future stop-offs! The H-17166 Fitting can be *stopped-off at any time using your existing MUELLER Line Stopper Equipment.*

Get full information on the MUELLER Mechanical Joint Insulated Line Stopper Fitting from your MUELLER Representative. Call him today or write us direct for details.

MUELLER CO. / DECATUR, ILL.

FACTORIES AT: DECATUR, CHATTANOOGA, BREA (LOS ANGELES), MUELLER, LTD., SARNIA, CANADA

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