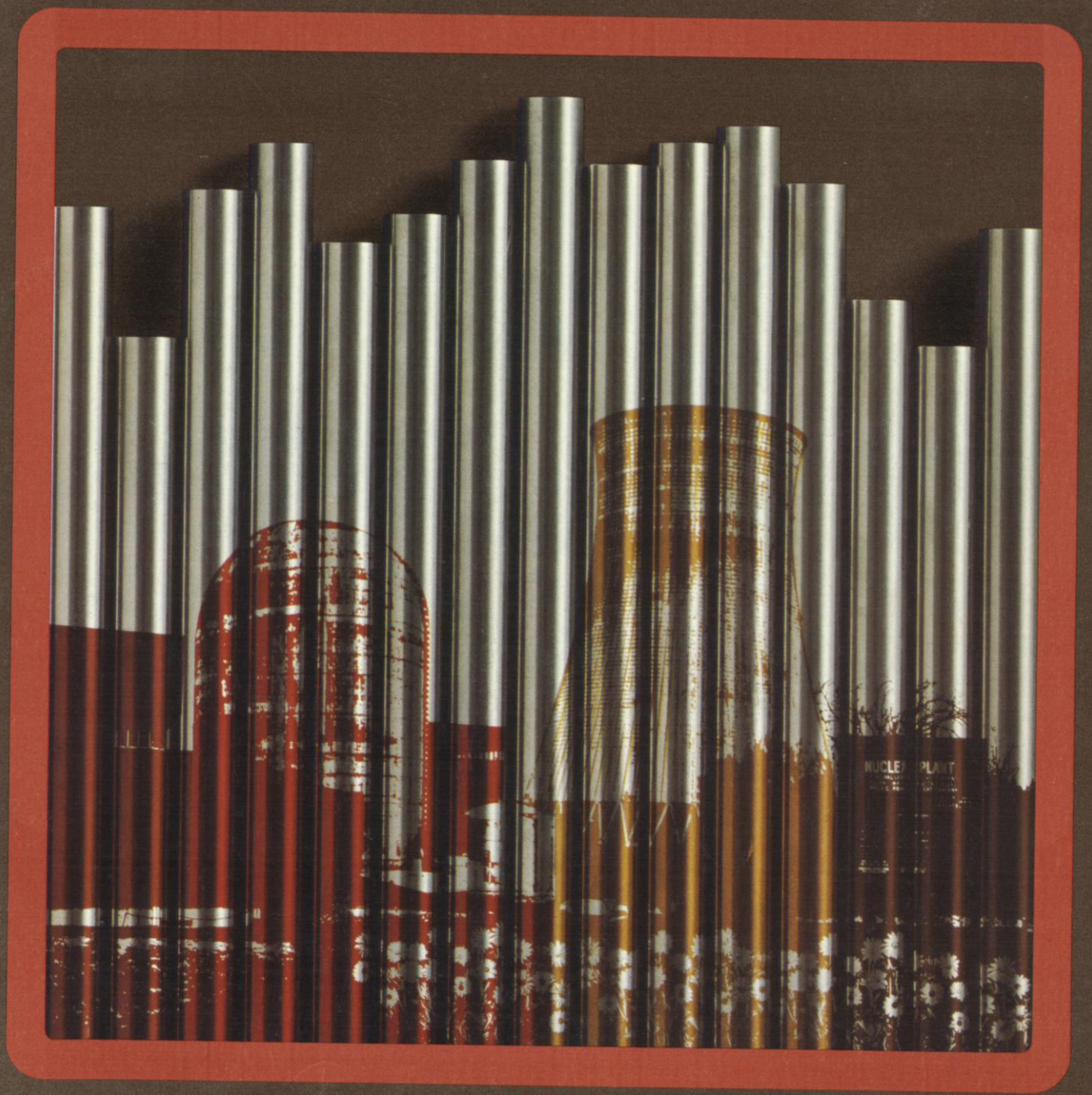
TeledyneReport

For the Year 1974

Zirconium: Fuel Container for Nuclear Power

CLEVELAND PUBLIC LIBRARY
BUSINESS INF. BUR.
CORPORATION FILE



This Teledyne Report

describes Teledyne's involvement in the burgeoning field of commercial nuclear electricity. Teledyne Wah Chang is the United States' largest producer of zirconium, an unusual metal that is used to encapsulate the uranium fuel in 95 percent of today's U.S. commercial power reactors. A modern reactor with an electrical capacity in the 1000 megawatt range requires the production of 80,000 to 140,000 pounds of high purity zirconium alloy. This same amount must be replaced each three to four years, as the reactor is refueled. Hafnium, a second nuclear-age metal produced by Teledyne Wah Chang, is used to fabricate control rods for some kinds of reactors.

TELEDYNE REPORT featuring subjects of particular interest from Teledyne activities, is issued on a quarterly basis. Previous topics include:

Workmen's Compensation Insurance: Most working people are already protected. The goal is coverage for every employed person.

Drilling for Offshore Oil: Almost half our national resources of oil and gas are believed to lie under offshore waters. The technology for getting them out is here—but it won't be easy.

The Search for Oil: With supplies dwindling and demand growing, sophisticated geophysical techniques are being brought to bear on the problem of locating new oil deposits.

High Speed Tool Steels: These precision, premium-priced alloys are vital to the production of virtually every commodity we use in modern life.

Energy Crisis in the Computer Room: As the quality of utility electrical power falls off and brownouts and blackouts become more common, the incidence of computer failures goes up. Solid-state Uninterruptible Power Systems can solve the problem.

Raydist: This ultraprecise electronic navigation system can pinpoint locations at sea with a sensitivity of one and a half feet at ranges of up to 250 miles from base stations.

Welding: One of industry's most versatile production techniques, welding is used in the manufacture of virtually every type of fabricated metal product made today.

General Aviation Engines: Propeller driven aircraft powered by conventional piston engines are not only alive and well more than 30 years after the advent of the jet, they dominate air activity today.

Rubber: Rubber compounds are being called on to do new technological jobs in applications ranging from industrial tires to Teledynes's new automotive bumper system that will dissipate five-mile-per-hour impacts.

Loran: Loran was one of the first all-weather electronic navigation systems. Recent Teledyne innovations have lowered costs and greatly improved its range and accuracy.

Seismology: This relatively young science has expanded from the classic study of earthquakes to become an important tool in oil and mineral exploration, detection of underground nuclear explosions and earthquake hazard reduction.

Casting: The simple process a small boy uses when he casts a tin soldier is the basis of a high technology industry that produces items ranging from high temperature turbine blades to 90-ton steel mill rolls.

AIDS: Aircraft Integrated Data Systems keep a running record of the vital functions of the new jumbo jets and provide airlines with an important tool for lowering costs associated with maintenance, fuel management and crew proficiency testing.

Thermoelectrics: Generators that convert heat directly into electricity are providing a practical new power source for applications ranging from space exploration to remote unattended weather stations.

Thin Metals: Less becomes more when space-age metals are rolled out into thin strip and foil. These new materials, already being used in thousands of products, are making new metalworking techniques possible.

The Reproduction of Music: Men began experimenting with methods of recording sound over 150 years ago, but it remained for electronics and some very recent developments to allow music to be reproduced with concert-hall realism.

The Crowded Spectrum: The lower portion of the radio spectrum is already overcrowded with hundreds of wireless services. Microwave devices such as the traveling wave tube are opening higher frequencies for practical use.

Science and Cinematography: Modern techniques of slow motion cinematography let scientists and engineers analyze actions and events that happen too fast for the eye to follow.

Superalloys: Materials that retain high strength at temperatures approaching 2000°F make the jet age possible.

Jets of Water for Dental Health: Studies show that high-pressure pulsed jets of water are a valuable aid in the care of teeth and gums.

The Last Eight Miles: The controlled descent to the surface of the moon was accomplished through use of a century-old principle called the Doppler effect.

ON THE COVER: An illustration of a modern nuclear power plant, showing the domed reactor containment building and its associated hyperbolic cooling tower, is superimposed on zirconium alloy fuel tubes produced from Teledyne material. The tubes are typically one-third to one-half inch in diameter and may be twelve or more feet in length. A 1000-megawatt reactor may have 50,000 of these tubes in its nuclear core.

© Teledyne, Inc.

The Energy Options

Nuclear fuels and coal are both abundant enough to make a significant contribution to U.S. energy needs over the next several decades. Unlike many other energy sources, the technology to use them on a large scale exists today.

An economist recently stated that nuclear fission is a fizzle. He cited the fact that it has been nearly 30 years since the nuclear age began, and that nuclear energy is nowhere near being a major substitute for oil. Many critics of nuclear energy would agree with this simplistic appraisal, but a glance at the charts on page 5 of this report will show that we are already ankle deep in the era of nuclear electricity, and the tide is coming in fast.

Not a moment too soon. It is becoming increasingly clear that the United States has only two fuel options to reduce its dependency on high-priced foreign oil and to meet the energy requirements of a healthy economy during the next several decades. Those options are its estimated 150 to 200 billion metric ton reserves of recoverable coal, and its even larger (in terms of energy content) resources of raw material for nuclear fuel. Neither of these sources, alone, will be able to supply the total future U.S. energy needs. They will, however, be able to generate a substantial portion of the electrical power that is now being generated by dwindling resources of natural gas, and by scarce and expensive supplies of petroleum, releasing these fuels for other energy uses. Perhaps even more important in the long run, they will help conserve petroleum for its many non-fuel uses as a source of basic chemicals for agriculture, industry and medicine.

There are other possible sources of energy—direct solar, geothermal, tidal, shale oil, tar sands, wind and, maybe someday in the distant future, fusion. But none of these offers a well developed technology for contributing any significant amount of energy, at the present or in the near future, to our tremendous requirements. Nuclear energy does.

HOW NUCLEAR ENERGY GOT WHERE IT IS

Regardless of when the nuclear age is believed to have begun, the era of commercial nuclear electric power generation didn't start until the early 1950's when nuclear technology and materials were first released from government-military secrecy and made available, under close control of the Atomic Energy Commission, for use by private industry. In the scant 20 years since then, an entirely new technology and hardware had to be developed and engineered around an entirely new physical principle—nuclear fission—under unprecedented safety and licensing constraints.

Technology did not lag. If anything delayed the more rapid development of nuclear generation of electricity, it was economics. Utilities simply did not have a strong incentive to make large capital investments in nuclear plants when it was cheaper to generate electricity with abundant and inexpensive fossil fuels.

But, just a few years ago, a new awareness of the environmental costs and damage to human life caused by pollutants, such as sulfur dioxide generated by burning coal and

oil, led to stringent pollution control requirements. These requirements greatly increased the costs of building, operating and maintaining conventional fossil fuel generating plants. More recently, complex economic conditions, including worldwide inflation, drastic price increases by oil producing and exporting countries, dwindling supplies of natural gas, and the expense of transporting low-sulfur coal from the western United States to eastern utilities, have combined to further increase the cost of generating electricity.

The result of these two factors—a rapidly developing technology and more competitive economics—has brought the U.S. commercial nuclear power industry from its first 5 megawatt (electrical) plant, to its present array of 56 stations with a combined electrical capacity of about 37,000 megawatts. (One thousand megawatts is enough to supply the needs of a city of about one million population.) Even more impressive are the figures for new plants now under construction or firmly committed. By 1980, 103 plants with a generating capacity of about 100,000 megawatts are expected to be on stream, and by 1985 a total of 204 plants is projected with a capacity of nearly 200,000 megawatts. It is estimated that nuclear generating capacity outside the U.S. will reach 140,000 megawatts by 1980, and 387,000 megawatts by 1985.

THE ECONOMICS OF ENERGY

Ultimately, the success or failure of any large scale energy source depends on the economics of producing energy in a usable form. The Atomic Energy Commission recently published figures comparing the costs of producing electricity using a 1000 megawatt nuclear power plant, and using the same size coal-fueled plant, in 1982.

The figures, which include an 8 percent per year increase in all costs to reflect the effect of continued high inflation, show a cost per kilowatt hour of 2.26 cents for the nuclear plant, compared to 2.89 cents for the coal-fueled plant. In this example, coal generated electricity is therefore about 28 percent more expensive than nuclear. Capital costs for the nuclear plant are initially higher, but both fuel costs and operation/maintenance costs for the atom are less than half of those for coal. Part of the difference in the operation and maintenance costs is associated with pollution control systems to remove sulfur dioxide from the coal plant effluents.

Both oil and natural gas seem to be out of the running, as far as current utility thinking goes. In 1974, most utilities shunned new plans for future construction of this type of plant because of the tremendous uncertainty of price and supply of these fuels.

TELEDYNE'S INVOLVEMENT IN NUCLEAR ENERGY

Teledyne's major activity in the commercial nuclear energy business is the production of two metals—zirconium and hafnium—that are used in reactor construction.

Teledyne Wah Chang is the United States' largest producer of zirconium metal. Zirconium is the ninth most abundant element in the earth's crust, but it is difficult to extract, involving some twenty complex chemical and metallurgical steps to produce the pure metal. Before the nuclear age it was a relative curiosity. Two of its properties, however, make it an important material for use in nuclear power generation reactors. The first is its transparency to thermal neutrons. These neutrons are the subatomic particles that are released by uranium 235 atoms (which fuel the reactor) during the nuclear fission process. (For a simplified explanation of how nuclear power reactors work, see the text and diagrams on pages 8 and 9.) The second useful property of zirconium is its great resistance to corrosion at high temperatures. In the two major types of nuclear power reactors that make up over 95 percent of the commercial power reactors now in use (the boiling water type and the pressurized water type) the uranium fuel is sealed in zirconium metal tubes about 1/3 to 1/2 inch in diameter, and a dozen or more feet in length. The zirconium cladding prevents radioactive fission products, which are produced in the fuel during the reaction, from entering and contaminating the water which acts as the reactor coolant and heat transfer medium. The neutrons generated by the fissioning uranium pass through the zirconium metal easily, and on through the water and into other fuel tubes. The energy of the speeding neutrons is either absorbed during this journey and converted to heat, which is the useful product of the reactor, or expended in striking the nucleus of another atom and continuing the chain reaction.

Since the zirconium tubing contains hot radioactive materials of various types and is

immersed in water at temperatures ranging from 545° to 605° F, its corrosion resistant properties are very important.

In some reactor designs, certain other structural parts of the reactor may also be made of zirconium for the same reasons. The fuel tubes in a typical reactor are arranged in closely spaced square bundles, and these bundles in turn are arranged in large arrays to make up the core of the reactor.

Reactor core design varies greatly with the type of reactor, the output capacity and the manufacturer. The Trojan Nuclear Plant which is nearing completion in Oregon, for example, is a pressurized water type with a net electrical output capacity of 1130 megawatts. In this particular reactor, the fuel tubes are arranged in square bundles of 17 rows of 17 tubes. The bundle includes 264 fuel tubes, with 25 positions taken up by control rods and instrumentation. A total of 193 bundles make up the core, with 50,952 zirconium alloy fuel tubes containing about 100 metric tons of uranium fuel.

An example of a modern boiling water reactor is the Browns Ferry Unit 3 which is located near Decatur, Alabama and scheduled for startup in 1975. This unit will have a net electrical capacity of 1098 megawatts. In this reactor, the fuel tubes are arranged in bundles of 8 tubes by 8 tubes with one position in the center reserved for a water tube. There will be 764 of these fuel bundles in the core for a total of 48,132 fuel tubes. A total of about 150 metric tons of uranium fuel will be used.

Teledyne Wah Chang also produces hafnium, another metal that is of great interest to nuclear engineers. Its important nuclear property is that it absorbs neutrons, being about 570 times more effective in this respect than zirconium.

In modern power reactors, the rate of the chain reaction, and thus the amount of heat developed, is controlled by inserting neutron absorbing materials between the fuel elements to intercept neutrons and thus slow down the reaction. Hafnium is one of the materials that is used for this purpose. It is interesting that both zirconium and hafnium are found in the same basic raw material, zircon sand. About two to three parts of hafnium occur for each hundred parts of zirconium. Hafnium, because of its neutron absorbing property, is an undesirable impurity in atomic grade zirconium, and must be removed completely. It is further refined and reduced to pure hafnium metal for fabrication into the control rods and plates used in some reactors.

THE MARKET FOR ZIRCONIUM

A typical modern boiling water reactor with a 1000 megawatt net electrical output requires about 140 pounds of zirconium ingot for each megawatt of output, or about 140,000 pounds for the initial fuel loading. A pressurized water reactor of similar capacity requires about 80 pounds per megawatt of electrical output, or some 80,000 pounds for the initial fueling.

As with any other fuel, the fissionable uranium in a reactor core is gradually used up, and periodically a certain percentage of the fuel tubes must be replaced to keep the reactor operating at full output. Typically, depending on reactor type and design, about 25 to 35 percent of the fuel tubes are replaced each year. Thus in roughly three to four years the complete fuel inventory is replaced and with it the same amount of zirconium used in the initial fueling.

In a type of reactor developed in Canada, that uses a pressure tube type of construction, more than 200 pounds of zirconium are required per megawatt of electrical output.

According to AEC figures recently published, 1,900,000 pounds of zirconium ingot were required for commercial reactors in 1974. (This does not include zirconium required for military reactors aboard ships and submarines, or non-nuclear uses of zirconium metal by the chemical and photographic industries.) An annual requirement of 14,300,000 pounds was projected by the AEC by 1985. These figures apply for U.S. reactors only.

POWER PLANT EFFICIENCY

Large modern nuclear power plants of the boiling water and pressurized water types achieve an efficiency of about 33 percent. This efficiency factor means that 33 percent of the heat generated by the reactor is converted into electrical energy. The remaining 67 percent is rejected as waste heat. This compares to an efficiency of about 40 percent for the most modern fossil fuel power plant. (By comparison, automobile engines, at 25 percent efficiency, transfer to the atmosphere three quarters of the heat from the fuel burned.)

The difference in efficiency between the two types of power plants is caused to some extent by the temperature of the steam delivered to the steam turbines. The higher the temperature, the more efficiently the turbines can run. With present technology, nuclear reactors do not generate steam at as high a temperature as do modern fossil fuel plants.

There is some concern about the environmental effects of the heat that is rejected by power plants. Raising the temperature of streams and lakes excessively is undesirable for many types of aquatic life, so stringent standards have been set up regarding the temperature of any cooling water that is released. This applies to all power plants—fossil fuel and nuclear alike—since both reject large quantities of heat to the environment.

One solution has been the use of huge hyperbolic cooling towers (such as the one shown on the cover) to cool the water by evaporation. This transfers the heat to the atmosphere instead of to water.

NON-ELECTRIC NUCLEAR ENERGY

The problem of what to do with waste heat from steam turbines raises the possibility of using it directly for heating purposes. This is already being done on a small scale. In New York City, for example, low pressure steam from electric power station turbines is distributed and used for heating buildings. Some chemical plants and refineries are also already using low pressure waste steam from turbines as a source of heat for various industrial processes.

Using heat in this way is far more efficient than converting it into electricity at a penalty of 60 to 70 percent loss, and then converting the electricity back into heat. The problem, however, is that power plants, particularly nuclear ones, are not usually close enough to potential users of low-grade energy to make distribution in this form practical.

It has been proposed that small scale nuclear reactors might be designed solely to produce heat. Plans for combination plants that would produce both electricity and surplus heat for other uses have also been made. Desalination of sea water with nuclear heat is one proposal for generating large quantities of fresh water in arid regions of the world for irrigation and life support. Gas-cooled nuclear reactors have already been proposed for supplying both heat and electricity for use directly in the steel-making process.

The direct use of nuclear heat offers some interesting possibilities. The largest power reactors that are now licensed in the U.S., for example, can produce 3800 megawatts of thermal energy. If used directly, this would be enough to supply the heating requirements of a city larger than Boston.

URANIUM VERSUS COAL

Uranium, with other related, potentially-fissionable ores, and coal are the two most abundant non-petroleum energy sources that the U.S. has. While the environmental effects of nuclear power plants have been closely scrutinized and publicized for decades, only in recent years, due to tightened air pollution standards, have the environmental costs of fossil fuel generating plants been examined.

The following comparisons are based on a nuclear and a coal-fired generating plant, each of 1000 megawatt electrical output, operating at an 80 percent capacity factor. Since western low-sulfur coal varies in heat content from 6000 to 12,000 BTU per pound, an average of 9000 BTU has been used.

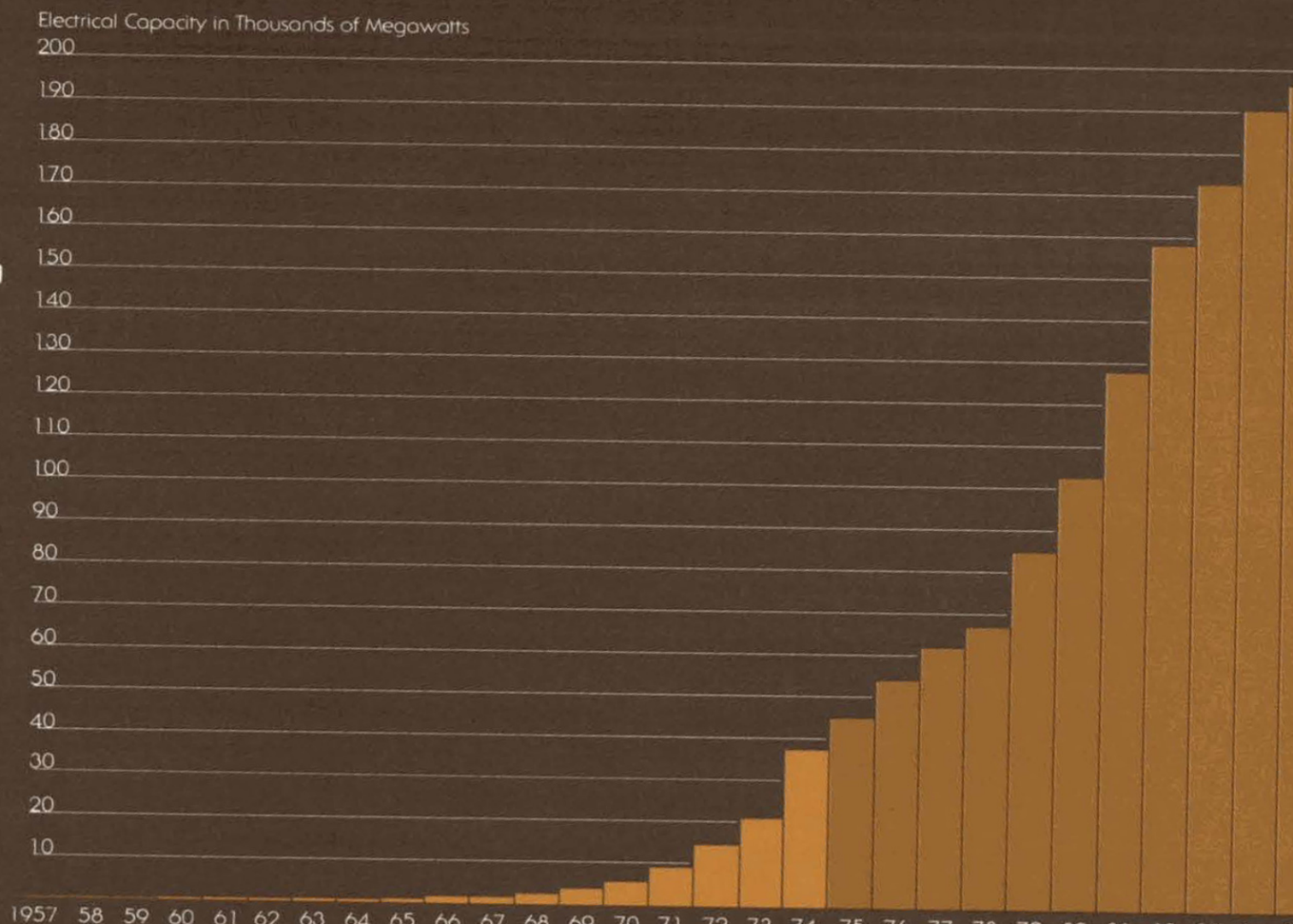
The nuclear reactor will use about 30 metric tons of enriched uranium per year of operation to produce 7 billion kilowatt-hours of electricity. It requires the mining of less than 91,000 metric tons of uranium ore to produce the enriched uranium fuel.

The coal-fired unit will consume about 3,500,000 tons of coal to produce the same amount of electricity. (10,000,000 barrels of oil would be required to equal this output with an oil-fired station.)

In the case of the coal-fired plant, this amounts to more than a 100-car trainload of coal delivered to the plant each day, while the nuclear plant is fueled about once a year with just 30 tons of enriched uranium fuel.

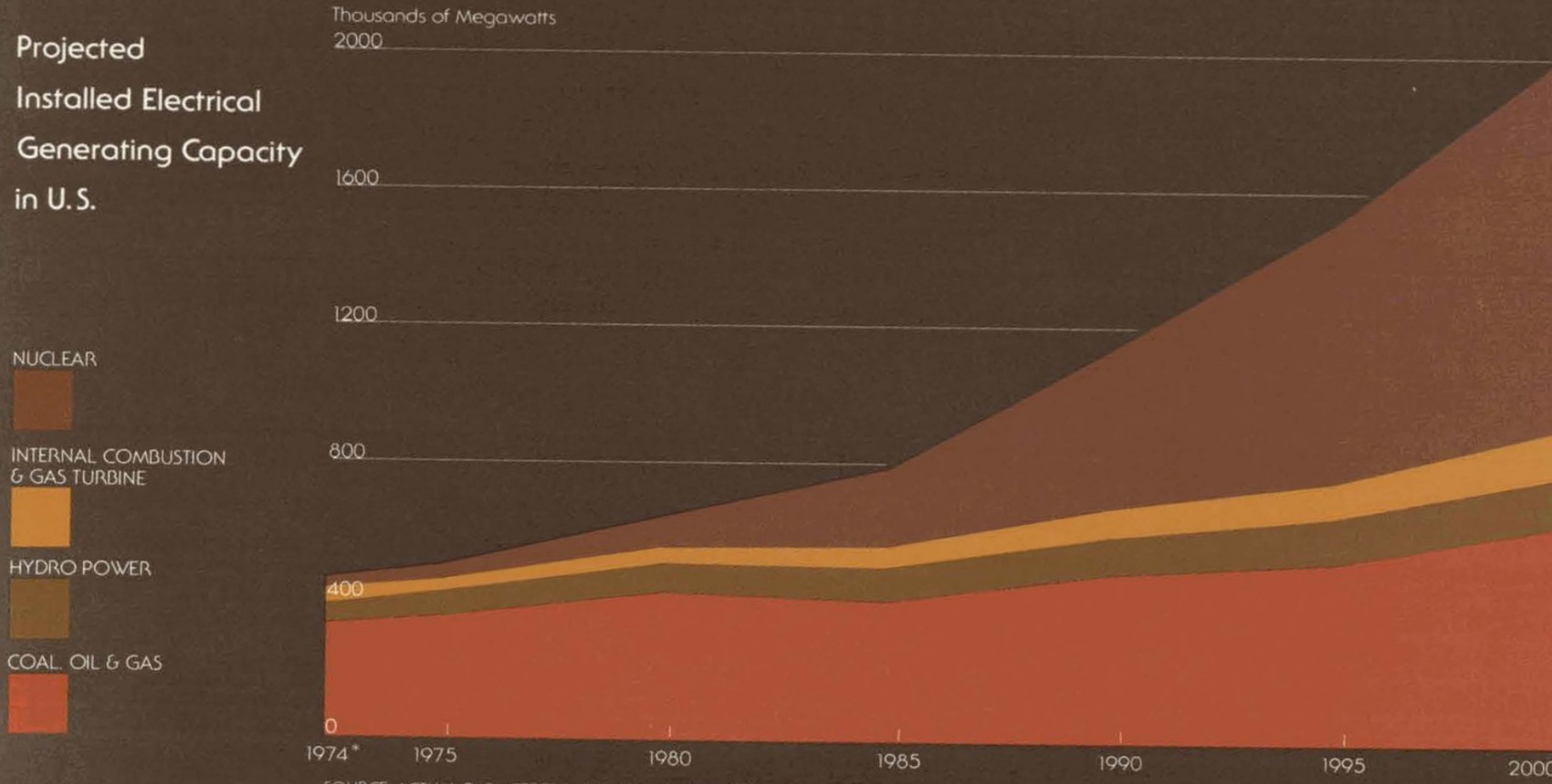
A nuclear plant of this capacity generates about 70 cubic feet of high-level solidified radioactive waste each year. It is estimated that all the nuclear wastes produced by all nuclear reactors up to the year 2000 would fill only 80,000 sealed steel canisters ten feet long by one foot in diameter. A floor space of about 25 square feet is required for each

Number of U.S. Commercial Nuclear Power Reactors and Net Electrical Generating Capacity



SOURCE: U.S. ATOMIC ENERGY COMMISSION TECHNICAL INFORMATION CENTER DECEMBER 31, 1974

Projected Installed Electrical Generating Capacity in U.S.



canister. This means the total waste produced by all nuclear power reactors in the U.S. up to the year 2000 could be stored in a land area of about 50 acres.

By comparison, the coal-fired plant will produce nearly a thousand tons of solid ash each day, or approximately a 40-car trainload. In a year this adds up to about 350,000 tons of ash per 1000 megawatt generating plant. The ash actually is the smallest part of the waste material generated. Most of the difference between the fuel burned (3,500,000 tons each year) and the ash (350,000 tons each year) is discharged to the atmosphere as part of the gaseous waste. This is largely the carbon in carbon dioxide, but may include such noxious substances as sulfur dioxide and nitrogen oxides. Coal burning plants must remove these elements from the plant effluent, and, depending on the process used, may generate substantial quantities of sulfur, sulfuric acid, sulfate compounds and other by-products that must be disposed of either as commercial products or as useless wastes.

The impact on the environment of generating large amounts of electrical energy with coal can be seen to be substantial, including the mining and transportation of vast amounts of material and the disposal of large volumes of solid and gaseous wastes.

THE NUCLEAR FUTURE

As the most tightly regulated commercial industry in the world, the nuclear energy industry is under the closest scrutiny and control. One non-technical problem that has recently slowed the continued development of nuclear energy is the difficulty that utilities are facing in finding capital, under present economic conditions, to meet the large costs of building new plants. This same problem is faced in the building of fossil fuel plants as well.

In the case of nuclear energy, however, the problem is worsened by the long construction times involved. Lead time for installing a new nuclear power plant has typically been 8 to 10 years. During the construction period, and while awaiting final licensing by the Nuclear Regulatory Commission after construction is completed, interest costs rise to tremendous levels without any return to the utility in the form of generating capacity.

Obtaining a construction permit for a nuclear plant can take from 4 to 20 months after considerable environmental and site evaluation studies and design work have been done. Obtaining an operating license after construction has been completed may take another 9 to 30 months.

Now that considerable experience in nuclear plant construction has been accumulated, it has been proposed that some of these procedures be shortened. One promising idea is the increased standardization of various nuclear power plant designs and equipment so that the total evaluation time could be shortened. It is thought that by this method a year or two might be trimmed from the total time required to put a nuclear plant on stream.

With the high cost and uncertain supply of natural gas and petroleum, and the severe environmental problems of using coal, it seems that nuclear energy, with its twenty-year record of proven reliability, may well be the cheapest and best answer for an energy-starved world.

NOTE: The U.S. Atomic Energy Commission was abolished by Congress in 1974. Its regulatory functions are now under the jurisdiction of the Nuclear Regulatory Commission. All other functions have been absorbed by the newly-created Energy Research and Development Administration.

How Zirconium is Made

Zirconium is the ninth most abundant element in the earth's crust, yet before the nuclear age it was little more than a laboratory curiosity. Its properties of transparency to thermal neutrons and its high corrosion resistance make it an ideal material for cladding the uranium fuel in the most widely-used types of nuclear reactors. It is also used to make piping and vessels for the chemical industry and is the active material in most flash bulbs.

The basic raw material for making zirconium metal is a type of beach sand, found in many parts of the world, that is rich in zirconium orthosilicate. It takes about twenty complex steps, half of them chemical, half metallurgical, to produce the pure metal.

The first step is to combine the sand with carbon and chlorine to produce impure zirconium tetrachloride and silicon tetrachloride. (The silicon material is further purified and sold as a by-product.)

Hafnium, another nuclear-age metal, appears as an impurity. It is removed in chemical towers seven stories high and reduced to the pure metal in a separate process.

The residual zirconium compound is then converted, by calcination in large kilns, to zirconium oxide.

Carbon and chlorine are again combined with the zirconium oxide to produce hafnium-free, pure zirconium tetrachloride.

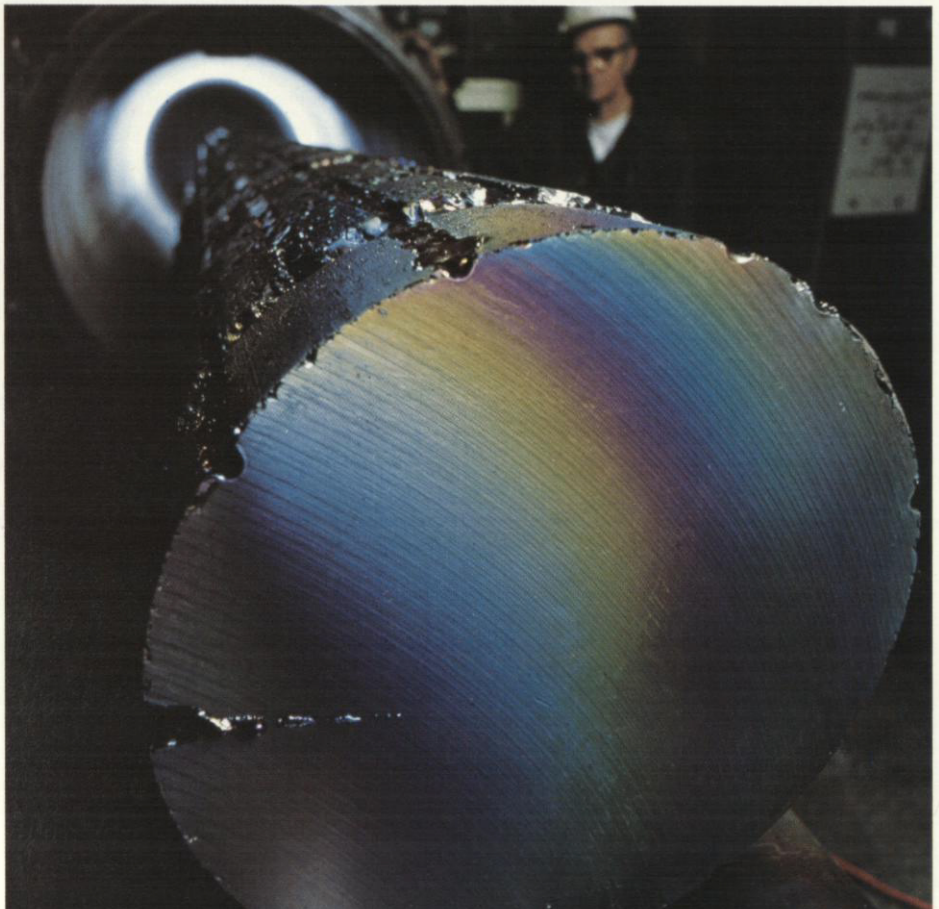
The pure zirconium tetrachloride is then combined with molten magnesium metal to reduce it to metallic zirconium in sponge form. Excess magnesium and magnesium chloride are removed from the sponge by a distillation process.

The pure sponge is then crushed, inspected and sorted, certain alloying elements are added, and finally it is hydraulically compressed into round briquets. The briquets are then electron beam welded into long rods which are used as electrodes in a vacuum consumable arc furnace. The electrodes are vacuum melted twice to produce ingots of zirconium 23 inches in diameter and weighing approximately 10,000 pounds.

The ingot is then machined to remove surface defects and hot forged into shapes and sizes required for rolling or drawing into finished products.

For reactor applications, most zirconium is ultimately fabricated into tubing 1/3 to 1/2 inch in diameter. Some other parts are fabricated from flat sheet. Because the fuel tubes must be totally leakproof to prevent the escape of radioactive fission products, the finished tubing is subjected to a battery of tests that include hydrostatic, pneumatic, eddy-current, ultrasonic, dye penetrant, burst, tensile, hardness, corrosion, and metallographic and chemical analysis.

Zirconium sponge electrode being removed from electron beam welder.



Double vacuum-melted zirconium ingot, ready for machining.

Zirconium tube blanks ready for conversion to finished tubing.

How an Atomic Power Plant Works

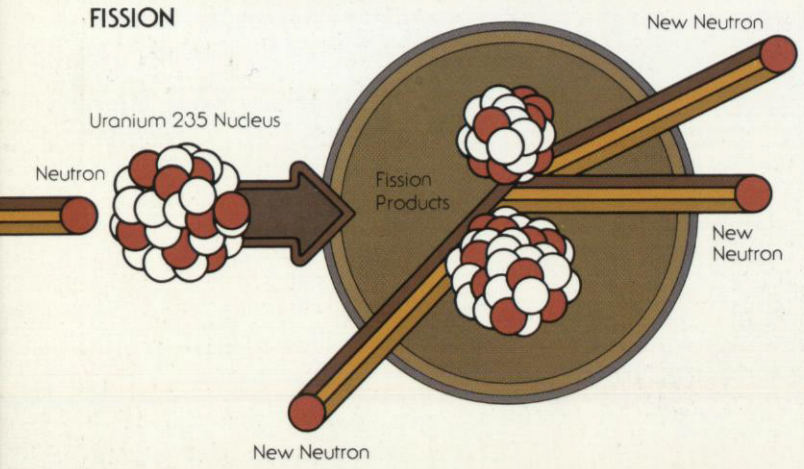
THE NUCLEAR PART

Most of the elements that make up our world are stable forms of matter that behave according to the classic laws of chemistry and physics. A few, however, exist in an unusual state in which the atomic structure is unbalanced and unstable. An atom of uranium 235, for example, will split to form two lighter atoms when its nucleus is struck by a neutron (a high speed subatomic particle). In this process each uranium 235 atom also gives off two or three new neutrons and releases energy in the process.

If one of these speeding neutron projectiles strikes the nucleus of a neighboring atom of uranium 235, it too splits and releases two or three more neutrons, and more energy. A collision between a neutron and a uranium nucleus is not inevitable, however, for if the atom were the size of a room, its nucleus would only be about as big as a grain of sand.

Nevertheless, this process can be made self-sustaining at a constant controlled rate, to create a nuclear chain reaction. The splitting of billions upon billions of uranium atoms generates the tremendous heat energy that is required to drive a nuclear power plant.

In the two most common types of nuclear power plants (the boiling water type and the pressurized water type) the uranium fuel, in the form of pellets, is sealed in zirconium alloy tubes about as big around as your finger and a dozen or so feet long. These tubes are arranged in square bundles of dozens to hundreds of tubes each, and a modern power reactor may have 50,000 or more fuel tubes in its nuclear core.



Zirconium is used as the cladding material for the fuel because neutrons can pass through it easily, and because of its excellent corrosion resistant properties.

The chain reaction in a power reactor is controlled by rods or plates of another material which are inserted between the fuel rods to absorb neutrons and slow the reaction. Hafnium, a metal derived as a by-product in the manufacture of zirconium, is frequently used for this purpose.

It was found, early in nuclear research, that neutrons are more effective in splitting other uranium atoms if they are slowed down somewhat by a moderating material. In most power reactors, the water in which the fuel rods are immersed, which carries away the heat of the reaction, acts as the moderator.

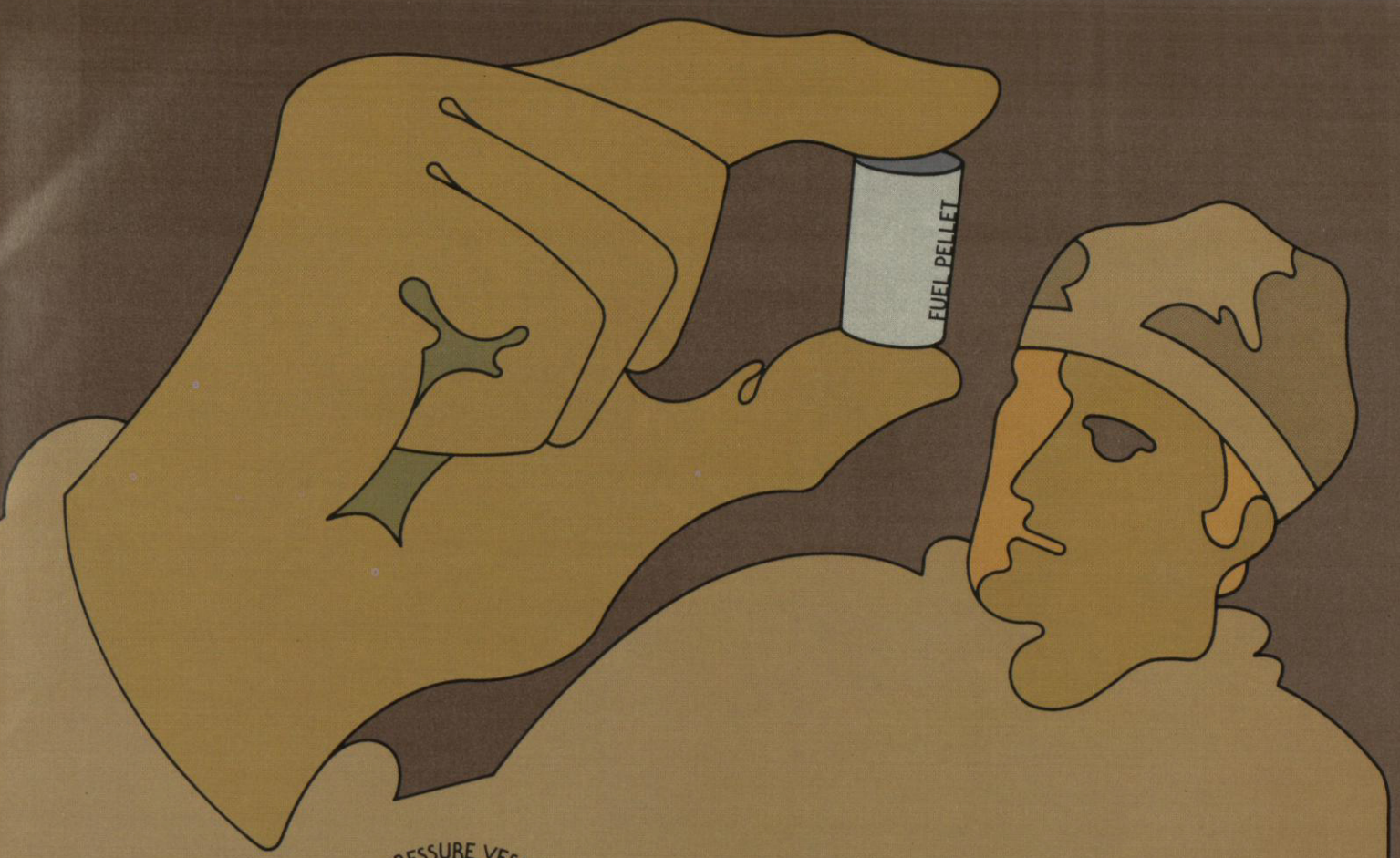
Other types of reactor designs include high temperature reactors which use helium gas, liquid metals or molten salts to transfer heat from the core to the steam generators.

Under development are breeder reactors of various types. In addition to producing electricity, these reactors will produce more fuel than they consume, by irradiating non-fissionable material such as uranium 238 and converting it to fissionable plutonium 239. The plutonium is extracted periodically and processed into new fuel. Thorium 232 may also be converted into fissionable uranium 233. Breeder reactors will ultimately greatly increase our resources of nuclear energy.

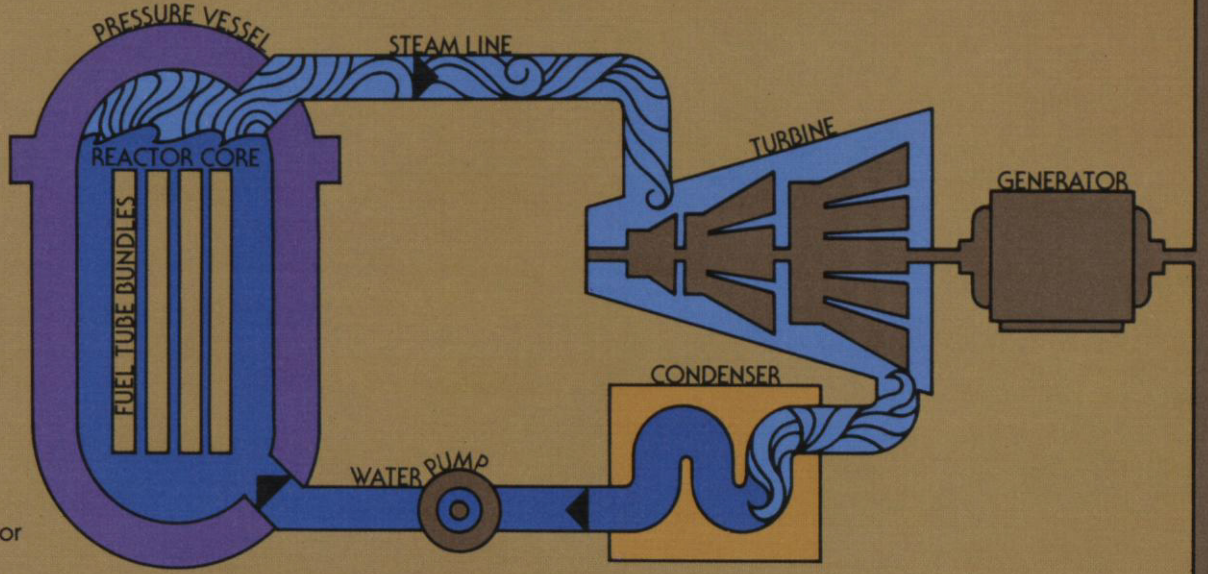
THE MECHANICAL-ELECTRICAL PART

The nuclear part of the power plant simply generates heat. From this point on a nuclear power plant is essentially the same as one that is fueled with coal or oil or natural gas. High-pressure, high-temperature steam is used to drive large steam turbines, which in turn spin the electrical generators that make electrical power.

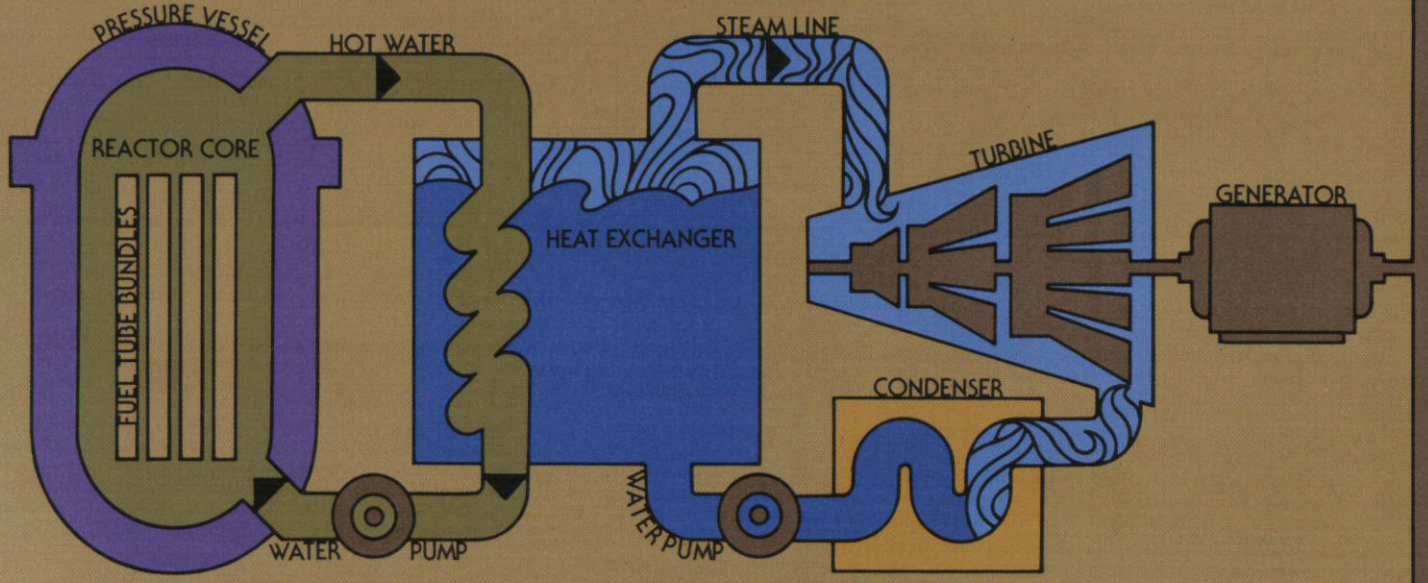
There are two methods of using the heat from the nuclear core to make steam. In the boiling water reactor, the water in the nuclear core vessel is allowed to boil and produce superheated steam to drive the turbines directly. The pressurized water reactor, on the other hand, keeps the water in the reactor vessel under higher pressure so it cannot boil. This high temperature water is circulated through a heat exchanger where it causes a secondary supply of water to boil and produce steam for the turbines.



Boiling Water Reactor



Pressurized Water Reactor

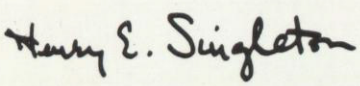


Sales and net income of consolidated companies reached all time record high levels in 1974. On the other hand, equity in net income of unconsolidated subsidiaries reflected a substantial loss for the year compared to last year's profit.

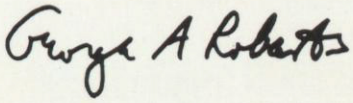
Teledyne's unconsolidated subsidiaries consist essentially of a life insurance group and a property and casualty insurance group. Profit of the life insurance group was satisfactory in 1974 at about the same level as 1973. The decline in Teledyne's profit for the year was more than accounted for by adverse underwriting experience in the property and casualty insurance group, primarily as a result of heavy losses in the medical malpractice coverage written by Argonaut Insurance Company.

Argonaut's main strength and its historic source of growth and profitability has been the writing of workmen's compensation insurance. Argonaut has also provided malpractice insurance on a moderate scale to hospitals for many years. Recently, however, Argonaut greatly increased its activity in malpractice insurance by providing coverage to individual physicians and surgeons. This business has been unprofitable. Statistical studies indicate that malpractice claims frequency is growing very rapidly and that the average size of claims and related awards and settlements is growing even faster. In contrast, the rate of increase in the corresponding premiums paid for the coverage has not kept pace. Experience shows that after a year of insurance coverage ends, claims related to that year continue to be made for many years in the future. This means that reserves to pay for future claims must be provided out of current premiums. Since the expected future claims and corresponding reserves now exceed the related current premiums, the difference must be recorded as a current loss. Argonaut's reserves now appear to be adequate to cover the expected losses. Most of the company's reserves are currently held in the form of marketable securities and a large percentage are invested in short-term commercial paper and certificates of deposit. It is expected that these reserves will be paid out gradually over a period of several years in the future.

Although Argonaut's financial condition is presently sound, the company is still losing money on individual physicians and surgeons malpractice policies. Argonaut intends to discontinue providing this coverage, and in order to remain solvent, Argonaut must cancel these policies or obtain adequate rates in the near future. A number of lawsuits opposing the necessary rate increases or cancellations exist, but Argonaut believes that these suits will be settled satisfactorily, and that the rate increases or cancellations will not be unduly delayed. Argonaut is continuing to provide hospital malpractice insurance, but for fewer risks at higher rates than in the past. The company's principal business will remain its workmen's compensation insurance. Once the malpractice insurance losses have been ended, Argonaut should be able to return to profitability.



Chairman of the Board of Directors



President

Highlights of Financial History

	Consolidated Sales	*Net Income*	*Net Income Per Share (1)*	*Consolidated Assets*	*Shareholders' Equity*	*Average Common Shares (1)*
1974	$1,699,987,000	$31,137,000	$1.29	$1,127,648,000	$497,208,000	22,407,795
1973	1,455,499,000	65,363,000	2.38	1,229,622,000	534,109,000	26,648,953
1972	1,215,991,000	57,444,000	1.53	1,126,401,000	481,873,000	36,140,926
1971	1,101,872,000	56,179,000	1.45	1,065,732,000	606,872,000	37,415,251
1970	1,216,448,000	61,864,000	1.64	1,035,746,000	577,137,000	36,574,564
1969	1,294,775,000	58,119,000	1.62	1,110,878,000	501,961,000	35,147,352
1968	874,905,000	45,161,000	1.36	766,680,000	362,780,000	33,176,554
1967	777,745,000	34,164,000	1.07	601,037,000	272,042,000	31,275,015
1966	700,211,000	31,693,000	1.03	437,845,000	229,372,000	29,540,524
1965	559,680,000	27,044,000	0.93	371,131,000	205,762,000	27,512,697
1964	465,304,000	20,195,000	0.74	311,667,000	173,069,000	25,263,164
1963	423,246,000	15,917,000	0.59	284,493,000	155,844,000	24,302,628
1962	388,420,000	11,291,000	0.41	259,247,000	134,536,000	23,322,593
1961	297,564,000	5,678,000	0.18	199,128,000	118,599,000	22,155,795

(1) Fully diluted and adjusted for a 3% stock dividend payable May, 1975.

Consolidated Balance Sheets

December 31, 1974 and October 31, 1973

Assets

	December 31, 1974	*October 31, 1973 (Note 2)*
Current Assets:		
Cash, including certificates of deposit of $39,727,000 in 1974 and $36,706,000 in 1973	$ 74,620,000	$ 77,613,000
Marketable securities, at cost which approximates market	14,408,000	25,301,000
Receivables, less reserve of $9,690,000 in 1974 and $7,691,000 in 1973	204,137,000	180,818,000
Inventories (Note 4)	186,100,000	201,505,000
Income tax refund receivable (Note 10)	21,100,000	—
Prepaid expenses	10,674,000	11,175,000
Total current assets	511,039,000	496,412,000
Investments in Unconsolidated Subsidiaries (Note 11):		
Unicoa Corporation (Note 12)	199,364,000	184,673,000
Argonaut Insurance Company (Note 13)	97,112,000	204,944,000
Other	6,320,000	11,831,000
	302,796,000	401,448,000
Property and Equipment, at cost (Note 5):		
Land	16,781,000	16,755,000
Buildings	107,612,000	104,978,000
Equipment and improvements	419,830,000	418,365,000
	544,223,000	540,098,000
Less – accumulated depreciation and amortization	276,144,000	254,934,000
	268,079,000	285,164,000
Other Assets:		
Cost in excess of net assets of purchased businesses (Notes 1 and 11)	33,895,000	33,681,000
Other	11,839,000	12,917,000
	45,734,000	46,598,000
	$1,127,648,000	$1,229,622,000

The accompanying notes are an integral part of these balance sheets.

Liabilities	*December 31, 1974*	*October 31, 1973 (Note 2)*
Current Liabilities:		
Accounts payable	$ 97,930,000	$ 82,275,000
Accrued liabilities	117,043,000	97,467,000
Accrued income taxes (Note 10)	—	11,800,000
Current portion of long-term debt	3,818,000	15,832,000
Total current liabilities	218,791,000	207,374,000
Long-Term Liabilities:		
Long-term debt (Note 5)	190,182,000	310,907,000
Deferred income taxes (Note 10)	20,000,000	29,200,000
Other	26,785,000	24,060,000
Subordinated Debentures (Note 5)	174,682,000	123,972,000
Commitments and Contingencies (Note 8)		
Shareholders' Equity:		
Preferred stock (1974 liquidation preference $35,224,000—Note 7)	692,000	692,000
Common stock (Notes 5, 6, 7 and 14)	32,340,000	32,339,000
Additional paid-in capital	413,387,000	418,310,000
Retained earnings (Notes 5, 7 and 11)	292,829,000	262,012,000
	739,248,000	713,353,000
Less – treasury stock, at cost:		
Common stock (13,938,679 shares in 1974 and 9,129,009 shares in 1973)	241,638,000	179,244,000
Series B preferred stock (10,000 shares in 1974)	402,000	—
Total shareholders' equity	497,208,000	534,109,000
	$1,127,648,000	$1,229,622,000

Consolidated Statements of Income

For the Years Ended December 31, 1974 and October 31, 1973

	December 31, 1974	*October 31, 1973 (Note 2)*
Consolidated Sales	**$1,699,987,000**	$1,455,499,000
Consolidated Costs and Expenses:		
Cost of sales	**1,372,982,000**	1,171,347,000
Selling and administrative expenses	**201,959,000**	186,358,000
Interest expense (Notes 5 and 11)	**16,293,000**	17,338,000
Interest income	**(10,450,000)**	(8,178,000)
Provision for currency translation (Note 11)	**5,110,000**	6,275,000
Gain on sale of assets	**(17,423,000)**	—
Provision for income taxes (Note 10)	**66,500,000**	41,600,000
	1,634,971,000	1,414,740,000
Income of Consolidated Companies	**65,016,000**	40,759,000
Equity in Net Income (Loss) of Unconsolidated Subsidiaries, after allocated expenses and income tax credits (Notes 5 and 11)	**(33,879,000)**	24,604,000
Net Income	**$ 31,137,000**	$ 65,363,000
Net Income Per Share of Common Stock and Common Stock Equivalents (equal to net income assuming full dilution – Note 3)	**$1.33**	$2.45
Adjusted for 3% common stock dividend payable May 26, 1975 (Note 14)	**$1.29**	$2.38

Consolidated Statements of Retained Earnings

For the Years Ended December 31, 1974 and October 31, 1973

	December 31, 1974	*October 31, 1973 (Note 2)*
Balance, Beginning of Year	**$274,688,000**	$215,571,000
Add or (Deduct):		
Net income	**31,137,000**	65,363,000
Fair value of common stock dividends (Note 7)	**(8,418,000)**	(13,743,000)
Dividends on preferred stock (Note 7)	**(4,578,000)**	(3,684,000)
Difference between cost and book value of Unicoa treasury stock	**—**	(1,495,000)
Balance, End of Year	**$292,829,000**	$262,012,000

The accompanying notes are an integral part of these statements.

Consolidated Statements of Capital Stock, Additional Paid-in Capital and Treasury Stock

For the Year Ended December 31, 1974, the Two Months Ended December 31, 1973 and the Year Ended October 31, 1973

	Preferred Stock ($1 Par Value)	*Common Stock ($1 Par Value)*	*Additional Paid-In Capital*	*Treasury Stock*
Balance, October 31, 1972	$714,000	$32,303,000	$419,758,000	$186,473,000
Common stock dividend (691,268 shares)	—	—	(77,000)	(13,815,000)
Stock option and purchase plans (Note 6)	—	35,000	700,000	(1,357,000)
Redemption of Series C preferred stock	(21,000)	—	(2,071,000)	—
Conversion of preferred stock	(1,000)	1,000	—	—
Purchase of common stock (557,700 shares)	—	—	—	7,943,000
Balance, October 31, 1973	692,000	32,339,000	418,310,000	179,244,000
Purchase of Series B preferred stock (10,000 shares)	—	—	—	402,000
Balance, December 31, 1973	692,000	32,339,000	418,310,000	179,646,000
Purchase of common stock (1,678,990 shares)	—	—	—	24,050,000
Exchange of debentures for common stock (3,963,014 shares)	—	—	—	53,776,000
Common stock dividend (647,512 shares)	—	—	(3,778,000)	(12,196,000)
Conversion of preferred stock	—	1,000	—	—
Stock purchase plan (168,571 shares)	—	—	(979,000)	(2,930,000)
Exercise of warrants (16,221 shares – Note 6)	—	—	(166,000)	(306,000)
Balance, December 31, 1974	$692,000	$32,340,000	$413,387,000	$242,040,000

The accompanying notes are an integral part of these statements.

Auditors' Report

To the Shareholders and
Board of Directors, Teledyne, Inc.:

We have examined the consolidated balance sheets of TELEDYNE, INC. (a Delaware corporation) and subsidiaries as of October 31, 1973 and December 31, 1974 and the related statements of income, capital stock, additional paid-in capital and treasury stock, retained earnings and changes in financial position for the years then ended. Our examinations were made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The consolidated financial statements of Unicoa Corporation and subsidiaries (Note 12) were examined by other auditors whose reports thereon have been furnished to us. Our opinion expressed herein, insofar as it relates to the amounts included for Unicoa Corporation and subsidiaries, is based solely upon the reports of the other auditors. Teledyne's investment in Unicoa was 15% in 1973 and 18% in 1974 of consolidated assets and its equity in Unicoa's net income, after allocated expenses as described in Note 11, was 19% in 1973 and 38% in 1974 of consolidated net income.

In our opinion, based upon our examinations and the reports of other auditors referred to above, the accompanying consolidated financial statements present fairly the consolidated financial position of Teledyne, Inc. and subsidiaries as of October 31, 1973 and December 31, 1974, and the results of their operations and changes in their financial position for the years then ended, all in conformity with generally accepted accounting principles which, except for the change (with which we concur) to the last-in, first-out method of determining the cost of certain inventories as indicated in Note 4 to the consolidated financial statements, were consistently applied during the periods.

ARTHUR ANDERSEN & CO.

Los Angeles, California,
February 17, 1975.

Consolidated Statements of Changes in Financial Position

For the Years Ended December 31, 1974 and October 31, 1973

	December 31, 1974	*October 31, 1973 (Note 2)*
Working Capital Was Provided By:		
Net income	$ 31,137,000	$ 65,363,000
Equity in net (income) loss of unconsolidated subsidiaries before allocated expenses	83,395,000	(36,325,000)
Depreciation and amortization	47,518,000	46,305,000
Provision for currency translation	11,850,000	13,400,000
Change in deferred income taxes (Note 10)	(5,700,000)	(3,300,000)
Working capital provided from operations	168,200,000	85,443,000
Increases in long-term and subordinated debt	54,301,000	63,858,000
Dividend from and intercompany transactions with unconsolidated subsidiaries	21,822,000	—
Dispositions of property and equipment	13,202,000	5,936,000
Issuance of common stock under employees' stock purchase and option plans	2,072,000	2,092,000
Other, net	3,011,000	2,465,000
	262,608,000	159,794,000
Working Capital Was Applied To:		
Reduction in long-term and subordinated debt (including currency translation)	138,778,000	66,318,000
Purchase of treasury stock	77,826,000	7,943,000
Additions to property and equipment	44,951,000	50,877,000
Dividends on preferred stock	4,578,000	3,684,000
Investments in unconsolidated subsidiaries	—	2,859,000
Redemption of preferred stock	—	2,092,000
	266,133,000	133,773,000
Increase (Decrease) in Working Capital	$ (3,525,000)	$ 26,021,000
Working Capital Increase (Decrease):		
Cash, including certificates of deposit	$ 36,322,000	$ 21,621,000
Marketable securities	(41,353,000)	15,797,000
Receivables	13,379,000	16,564,000
Inventories	(15,436,000)	15,624,000
Income tax refund receivable	21,100,000	—
Prepaid expenses	1,129,000	(320,000)
Accounts payable	(19,731,000)	(29,188,000)
Accrued liabilities	(25,631,000)	(11,760,000)
Accrued income taxes	15,400,000	(8,300,000)
Current portion of long-term debt	11,296,000	5,983,000
	$ (3,525,000)	$ 26,021,000

The accompanying notes are an integral part of these statements.

(1) Summary of significant accounting policies. *Principles of consolidation.* The consolidated financial statements of Teledyne, Inc. include the accounts of all its subsidiaries except its insurance and finance companies. The investments in unconsolidated subsidiaries, which include advances, are accounted for by the equity method. All material intercompany accounts and transactions have been eliminated.

Currency translation. Current assets and current liabilities of foreign subsidiaries are expressed at the rate of exchange in effect at year end, and exchange adjustments are charged or credited to income. Non-current assets and liabilities are expressed at rates in effect at the time of the transactions. The Company provides for the estimated effect of changes in exchange rates applicable to long-term debt repayable in foreign currencies.

Inventories. Inventories are stated at the lower of cost (last-in, first-out and first-in, first-out methods) or market, less progress payments received. Sales and related costs are recorded as products are delivered and as services are performed, including products and services under long-term contracts. Any foreseeable losses are charged to income when determined.

Depreciation and amortization. Buildings and equipment are depreciated on straight-line and declining balance bases. Estimated useful lives are 5 to 45 years for buildings, and 3 to 20 years for machinery and equipment. Leasehold improvements and patents are amortized on a straight-line basis over the life of the lease or patent. Maintenance and repairs are charged against income as incurred and betterments and major renewals are capitalized. Cost and accumulated depreciation of property sold or retired are removed from the accounts and the resultant gain or loss is included in income.

Cost in excess of net assets of purchased businesses. Cost in excess of net assets of purchased businesses, all of which relates to businesses purchased prior to October 31, 1970, is not being amortized. Amounts totaling $1,750,000, representing additional costs in connection with a purchase consummated in fiscal 1969, were added in 1974, and $1,536,000 was charged to income in 1974 since it represented no further value to the Company.

Research and development. Company funded research and development costs are expensed as incurred. Costs related to customer funded research and development contracts are charged to income as sales are recorded.

Pension expense. Pension expense is accrued at amounts equal to normal cost plus a portion of prior service costs.

Income taxes. Provision for income taxes includes state, Federal and foreign income taxes. Deferred income taxes are provided for timing differences in the recognition of income and expenses, income of the domestic international sales corporation not currently taxed, and undistributed earnings of subsidiaries, except for a portion of the earnings of life insurance subsidiaries. The investment tax credits are amortized over the estimated lives of the related assets.

(2) Change in fiscal year end. In 1974, the Company changed its fiscal year end from October 31 to December 31. The results of operations for the two months ended December 31, 1973, which have been credited to retained earnings, are summarized below:

Consolidated sales	$227,791,000
Income of consolidated companies before income taxes	$ 10,007,000
Provision for income taxes	5,000,000
Income of consolidated companies	5,007,000
Equity in net income of unconsolidated subsidiaries after allocated expenses and income tax credits	4,625,000
Net income ($.37 per share)	9,632,000
Retained earnings, October 31, 1973	262,012,000
Equity in net income of unconsolidated subsidiaries for one month period	3,044,000
Retained earnings, December 31, 1973	$274,688,000

Annual reports in prior years have included the results of operations of unconsolidated subsidiaries for fiscal years ending on September 30. In connection with the Company's change in fiscal year end, these subsidiaries' year ends were also changed to December 31. To accomplish this change, the equity in the net income of unconsolidated subsidiaries for the one month period, without any allocated expenses or income tax credits, has been credited directly to retained earnings above.

(3) Net income per share of common stock and common stock equivalents. Net income per share is based on the weighted average number of shares of common stock and common stock equivalents outstanding during each year (21,755,141 in 1974 and 25,872,770 in 1973), including all convertible debt, Series B preferred stock and all dilutive options and warrants. Each common stock equivalent has been considered outstanding from the beginning of each year or date of issuance, and the related dividend requirement or interest has been eliminated.

(4) Inventories.

	December 31, 1974	*October 31, 1973*
First-in, first-out method	$ 34,878,000	$126,988,000
Last-in, first-out method	211,295,000	110,354,000
	246,173,000	237,342,000
Less—progress billings	60,073,000	35,837,000
	$186,100,000	$201,505,000

In 1974, the Company extended its use of the last-in, first-out method of valuing inventory in order to reflect more accurately the results of operations by matching current costs against current revenues. As a result, income of consolidated companies and net income were reduced by $6,400,000, or $.29 per share, in 1974. Since inventories at the beginning of the year are the base inventories under the last-in, first-out method, there is no effect on the results of operations of prior years. Inventories stated on a last-in, first-out basis were $86,278,000 and $37,129,000 less than their first-in, first-out values at December 31, 1974 and October 31, 1973, respectively.

(5) Long-term debt and subordinated debentures.

Long-term debt—	*December 31, 1974*
7½% Term Notes, due 1982, $15,000,000 payable annually commencing in 1979	$ 75,000,000
7¼% Notes, due 1979 to 1988	31,264,000
7⅞% Sinking Fund Debentures, due 1994, $1,400,000 payable annually	24,047,000
7% Promissory Notes, due 1989, $1,500,000 payable annually	22,750,000
6½% Sinking Fund Debentures, due 1992, $1,350,000 payable annually	20,089,000
6¼% to 6½% Notes, due 1976 to 1979	5,579,000
Other (including $8,866,000 secured by land and buildings), due in various installments to 1986	15,271,000
	194,000,000
Less—current portion	3,818,000
	$190,182,000
Subordinated debentures—	
10%, due 2004, Series A, $3,951,000 payable annually commencing in 1994 (net of unamortized discount of $24,949,000)	$ 54,071,000
3½%, due 1992, $3,000,000 payable annually commencing in 1978 (convertible into common stock at $49.39 per share)	49,418,000
7%, due 1999, $1,871,000 payable annually commencing in 1989	36,783,000
6½%, due in annual installments from 1979 to 1983	34,410,000
	$174,682,000

Long-term debt and subordinated debentures are payable $3,818,000 in 1975, $5,154,000 in 1976, $7,077,000 in 1977, $4,468,000 in 1978 and $27,106,000 in 1979. Interest expense was $37,785,000 in 1974 and $37,104,000 in 1973, of which $21,492,000 in 1974 and $19,766,000 in 1973 was allocated to unconsolidated subsidiaries.

The Company repurchased $59,071,000 and $9,097,000 face amount of its long-term debt and subordinated debentures in 1974 and 1973, respectively, with the resulting gains included in the results of operations in selling and administrative expenses. These transactions resulted in an increase in net income of $2,555,000, or $.12 per share, in 1974, and $1,424,000, or $.06 per share, in 1973.

Under the various borrowing agreements, the Company has agreed to maintain minimum amounts of working capital and net worth, and has agreed to certain restrictions with respect to borrowings, purchase and sale of assets and capital stock and payment of dividends. At December 31, 1974, these agreements were complied with, and retained earnings of $104,607,000 were not restricted by these agreements as to payment of dividends.

The Company has domestic credit lines with various banks totaling $92,000,000 at December 31, 1974, none of which was used during 1973 or 1974. Compensating balance arrangements of an informal nature exist and had no material effect on the Company's consolidated financial statements at December 31, 1974.

The Company has reserved 1,000,567 shares of common stock for issuance upon conversion of the subordinated debentures.

(6) Stock options and warrants. At December 31, 1974, 352,464 shares of common stock were reserved for issuance under outstanding options at prices from $12 to $19 per share (options for 284,006 shares were exercisable) and 619,921 shares of common stock were reserved for the granting of additional options. At October 31, 1973, 404,406 shares of common stock were reserved for issuance under outstanding options and 567,979 shares of common stock were reserved for the granting of additional options. During 1974, no options to purchase shares of common stock were granted or exercised and options covering 51,942 shares were canceled.

At December 31, 1974, 374,037 shares of common stock were reserved for issuance under warrants, each of which provides for the purchase of 10.87 shares at $46.06 per share until October, 1978. In addition,1,528 shares were reserved for issuance under other warrants.

(7) Capital stock. At December 31, 1974 and October 31, 1973, the Company's capital stock consisted of the following shares:

	Authorized	*December 31, 1974*	*October 31, 1973*
Cumulative convertible preferred stock, $1 par value	15,000,000		
$6 series—Issued and Outstanding		**517,336**	517,336
Series B—Issued		**174,507**	174,819
—Outstanding		**164,507**	174,819
Common stock, $1 par value	60,000,000		
Issued		**32,339,685**	32,338,904
Outstanding		**18,401,006**	23,209,895

The 1973 financial statements and related notes, except for shareholders' equity, have been restated to reflect a 3% common stock dividend paid in April, 1974.

The holders of the $6 series preferred stock are entitled to voting rights and cumulative annual dividends at the rate of $6.00 per share. Such stock is redeemable at $100 per share after April 22, 1978, and is convertible at any time into 1.34 shares of common stock. The holders of the Series B preferred stock are entitled to voting rights and cumulative annual dividends at the rate of $3.20 per share. Such stock is redeemable at $80 per share and is convertible at any time into 2.54 shares of common stock. The Company has reserved 1,112,723 shares of common stock for conversion of all preferred shares.

As a result of the change in fiscal year end, a total of five regular quarterly preferred stock dividends were declared and accrued in 1974.

At December 31, 1974, 346,345 shares of common stock were reserved for issuance to employees under a stock purchase plan.

(8) Commitments and contingencies. Total rental expense was $17,523,000 and $17,274,000 in 1974 and 1973, respectively. Annual rentals under long-term leases are $8,522,000 in 1975, $7,601,000 in 1976, $5,983,000 in 1977, $4,368,000 in 1978 and $3,605,000 in 1979. Aggregate rentals are $10,454,000 for 1980 through 1984, $5,803,000 for 1985 through 1989, $2,631,000 for 1990 through 1994 and $359,000 in total thereafter.

Argonaut Insurance Company, an unconsolidated subsidiary, is a party to various lawsuits involving its right to increase rates on malpractice liability insurance and/or its right to cancel malpractice liability insurance policies. If Argonaut were to be prevented from either increasing its rates or canceling outstanding policies, it could become insolvent. However, management believes that these suits will be settled satisfactorily, and that the rate increases or cancellations will not be unduly delayed.

(9) Pensions. Total pension expense was $23,621,000 in 1974 and $15,095,000 in 1973. The Company contributes accrued pension costs on a current basis. During 1974, the benefits under certain plans were increased, and certain actuarial methods and assumptions were changed. The actuarially computed value of vested benefits and prior service costs for all plans as of April 30, 1974, the date of the most recent actuarial study, exceeded the total of the pension funds and balance sheet accruals by approximately $84,700,000 and $106,600,000,respectively.

Notes to Consolidated Financial Statements

(10) Income taxes. The provision for income taxes was as follows:

	Year Ended December 31, 1974	Year Ended October 31, 1973
Federal	$53,300,000	$32,700,000
State	8,700,000	5,300,000
Foreign	4,500,000	3,600,000
	$66,500,000	$41,600,000

Income taxes for the two years is composed of the following elements:

	Year Ended December 31, 1974	Year Ended October 31, 1973
Current	$58,300,000	$43,700,000
Deferred	9,800,000	(700,000)
Investment credits	(1,600,000)	(1,400,000)
	$66,500,000	$41,600,000

The major components of deferred taxes in 1974 were related to income of the domestic international sales corporation ($3,600,000), gain on retirement of debt ($2,500,000), realized loss on currency translation on retirement of foreign debt, net of additional provision ($1,300,000), and deferred investment tax credits ($1,200,000).

The total effective income tax rate on pre-tax income of consolidated companies is 50.6% for 1974 and 50.5% for 1973, which differs from the statutory U. S. Federal income tax rate of 48% for the following reasons:

	Year Ended December 31, 1974	Year Ended October 31, 1973
Income tax at statutory rate	48.0%	48.0%
Amortization of investment credits	(1.2)	(1.7)
State and local income taxes, net of Federal income tax benefit	3.4	3.3
Capital gains subject to capital gain tax rate	(2.2)	(.3)
Costs and expenses not deductible for Federal tax purposes	2.5	.6
Other, net	.1	.6
	50.6%	50.5%

(11) Investments in unconsolidated subsidiaries. Equity in net income (loss) of unconsolidated subsidiaries, after allocated expenses and income tax credits, was as follows:

	Year Ended December 31, 1974	Year Ended October 31, 1973
Equity in net income (loss) of –		
Unicoa Corporation (Note 12)	$ 20,876,000	$20,039,000
Argonaut Insurance Company (Note 13)	(104,602,000)	18,323,000
Other	331,000	(2,037,000)
	(83,395,000)	36,325,000
Allocated expenses –		
Interest expense	(21,492,000)	(19,766,000)
Provision for currency translation	(6,740,000)	(7,125,000)
Income tax credits	77,748,000	15,170,000
	$ (33,879,000)	$24,604,000

The income tax credits consist of amounts related to allocated expenses ($14,371,000 in 1974 and $13,424,000 in 1973) and amounts related to losses of unconsolidated subsidiaries which are recoverable in Teledyne's consolidated tax return but which are not available to the unconsolidated subsidiaries on a separate return basis ($63,377,000 in 1974 and $1,746,000 in 1973). The effective tax rate used in computing the income tax credits related to losses of unconsolidated subsidiaries differs from the statutory U.S. Federal income tax rate of 48% principally because of tax exempt investment income and capital gain (loss) tax rates. Deferred income tax credits were $10,400,000 in 1974 and $3,600,000 in 1973.

Interest expense was allocated to unconsolidated subsidiaries based on Teledyne's average cash investment, including net intercompany balances, in these subsidiaries of $190,400,000 in 1974 and $199,100,000 in 1973, and a portion of the investment in the Company's treasury stock ($57,500,000 in 1974 and $49,000,000 in 1973) based on the ratio of its equity represented by its average investment in unconsolidated subsidiaries to average total equity. Interest rates for allocated interest averaged 8.5% in 1974 and 8.2% in 1973. The provision for currency translation was allocated on the same bases as interest expense.

The Company's equity in the net assets of its unconsolidated subsidiaries, including advances, was $106,210,000 in 1974 and $204,574,000 in 1973 including its equity of $44,347,000 and $130,663,000, respectively, in their retained earnings. The Company's investment exceeded its equity in net assets by $196,586,000 in 1974 and $196,874,000 in 1973. Such excess is in addition to the excess shown in the consolidated balance sheets and is not being amortized since, in the opinion of management, there has been no diminution in its value. In consolidation, a portion of the difference between Teledyne's investments in purchased subsidiaries and the book value of their assets has been allocated to bonds and stocks and amortized over the applicable maturity of the bonds or charged or credited to income upon their disposition. The Company's equity in net income (loss) of its unconsolidated subsidiaries includes net realized losses on sale of investments of $25,611,000 in 1974 and $624,000 in 1973.

In 1974, Unicoa's unrealized loss on investments increased $25,424,000 from $30,594,000 to $56,018,000; in 1973, it increased $1,122,000 from $27,116,000 to $28,238,000. In 1974, Argonaut's unrealized loss on investments increased $89,520,000 from $1,088,000 to $90,608,000; in 1973, the unrealized gain increased $8,819,000 from $11,971,000 to $20,790,000. In 1974, these amounts included increases in unrealized losses of $6,942,000 and $2,941,000 for Unicoa and Argonaut, respectively, related to investments in common and preferred stocks.

(12) Unicoa Corporation and subsidiaries. The following condensed statements summarize the consolidated financial position and operating results of Unicoa Corporation and subsidiaries. Teledyne owned 90.9% and 90.2% interests at December 31, 1974 and October 31, 1973, respectively.

Consolidated Balance Sheets

	December 31, 1974	*September 30, 1973*
Assets:		
Bonds, at amortized cost (market: 1974 – $210,000,000; 1973 – $186,000,000)	$247,462,000	$206,621,000
Stocks, principally at cost (market: 1974 – $42,000,000; 1973 – $49,000,000)	60,556,000	56,617,000
Mortgage loans	154,802,000	148,239,000
Real estate, at cost less accumulated depreciation	41,867,000	42,478,000
Loans to policyholders	13,442,000	10,254,000
Cash, including certificates of deposit	31,752,000	22,592,000
Premiums deferred and uncollected	24,465,000	26,187,000
Deferred policy acquisition costs	92,947,000	74,931,000
Cost in excess of net assets of purchased businesses	24,192,000	14,919,000
Other assets	22,174,000	17,132,000
	$713,659,000	$619,970,000
Liabilities:		
Policy reserves and liabilities	$524,755,000	$457,233,000
Notes payable to bank	1,400,000	6,393,000
Mortgage loan payable	8,825,000	9,630,000
Subordinated debentures	22,600,000	22,600,000
Other liabilities	45,326,000	40,468,000
Shareholders' equity –		
Common stock	18,732,000	18,732,000
Additional paid-in capital	1,975,000	1,975,000
Retained earnings	158,997,000	131,890,000
	179,704,000	152,597,000
Less – treasury stock, at cost	68,951,000	68,951,000
Total shareholders' equity	110,753,000	83,646,000
	$713,659,000	$619,970,000

Notes to Consolidated Financial Statements

Consolidated Statements of Income

	Year Ended December 31, 1974	Year Ended September 30, 1973
Income:		
Premiums and other insurance income	$235,982,000	$215,405,000
Investment income less expenses	32,948,000	23,414,000
Other income	2,719,000	3,156,000
	271,649,000	241,975,000
Expenses:		
Benefits paid or provided	127,239,000	117,299,000
Insurance expenses	105,699,000	93,630,000
Provision for income taxes	11,925,000	8,575,000
	244,863,000	219,504,000
	26,786,000	22,471,000
Loss on Sale of Investments, Less Applicable Income Tax Credit	4,683,000	460,000
Net Income	$ 22,103,000	$ 22,011,000

The above statements have been prepared on the basis of generally accepted accounting principles which differ from statutory insurance accounting practices. Unicoa recognizes revenues from life insurance premiums when they become due and revenues, benefits and expenses on accident and health insurance over the period to which the premiums relate. Deferred taxes are provided for timing differences in the recognition of income and expenses.

In conjunction with Teledyne's change in fiscal year end, the net income of Unicoa Corporation and subsidiaries for the three months ended December 31, 1973 has been credited to retained earnings. The results of operations are summarized below:

Premium and other income	$70,790,000
Net Income	$ 5,004,000

A portion of life insurance company income is not subject to Federal income tax until such amount exceeds certain limitations or is distributed to shareholders as dividends. At December 31, 1974, up to $50,000,000 (at current tax rates) would be required for possible Federal income taxes which might become due, in whole or in part, in future years if any portion of $104,000,000 of the gains from operations since January 1, 1959, becomes includable in taxable income as a result of such limitations, including distributions in excess of $12,000,000 as dividends.

(13) Argonaut Insurance Company and subsidiaries. The following condensed statements summarize the consolidated financial position and operating results of Argonaut Insurance Company and subsidiaries.

Consolidated Balance Sheets

	December 31, 1974	September 30, 1973
Assets:		
Bonds, at amortized cost (market: 1974 – $449,000,000; 1973 – $424,000,000)	$ 532,947,000	$405,320,000
Stocks, at cost (market: 1974 – $36,000,000; 1973 – $70,000,000)	42,661,000	67,890,000
Agents' balances and uncollected premiums	84,016,000	58,483,000
Other receivables	35,733,000	23,224,000
Deferred policy acquisition costs	19,164,000	25,260,000
Property and equipment, at cost, less accumulated depreciation	11,520,000	12,042,000
Cash	12,439,000	4,864,000
Investment in unconsolidated subsidiary	22,678,000	20,730,000
Cost in excess of net assets of purchased businesses	8,589,000	8,589,000
	$ 769,747,000	$626,402,000
Liabilities:		
Loss and claim reserves	$ 468,237,000	$281,211,000
Accrued loss adjustment expenses	85,258,000	46,179,000
Unearned premiums	142,761,000	121,430,000
Accrued income taxes	780,000	3,854,000
Other liabilities	43,345,000	32,127,000
Shareholder's equity	29,366,000	141,601,000
	$ 769,747,000	$626,402,000

Notes to Consolidated Financial Statements

Consolidated Statements of Operations

	Year Ended December 31, 1974	Year Ended September 30, 1973
Income:		
Net premiums earned	$ 395,742,000	$311,033,000
Investment income less expenses	36,131,000	26,525,000
	431,873,000	337,558,000
Expenses:		
Losses and loss adjustment expenses	421,099,000	248,108,000
Underwriting expenses	95,661,000	77,038,000
Income tax credit	—	(4,753,000)
	516,760,000	320,393,000
	(84,887,000)	17,165,000
Loss on Sale of Investments, Less Applicable Income Tax Credit in 1973	21,373,000	220,000
Income (Loss) of Consolidated Companies	(106,260,000)	16,945,000
Equity in Net Income of Unconsolidated Subsidiary	1,658,000	1,378,000
Net Income (Loss)	$(104,602,000)	$ 18,323,000

The above statements have been prepared on the basis of generally accepted accounting principles which differ from statutory insurance accounting practices. Premium income, policy acquisition costs, and policyholder dividends are recognized ratably over the period to which the premiums relate. Losses and loss adjustment expenses are provided at the estimated amounts necessary to settle outstanding claims. Loss and claim reserves include a reserve of $24,000,000 for future losses on medical malpractice coverage in force at December 31, 1974. Reserves are provided for catastrophe losses. Deferred taxes are provided for timing differences in the recognition of income and expenses to the extent such deferred taxes are determined to be recoverable.

In conjunction with Teledyne's change in fiscal year end, the fiscal year end of Argonaut Insurance Company was changed from September 30 to December 31. The results of operations for the three months ended December 31, 1973, which have been credited to unappropriated surplus, are summarized below:

Net premiums earned	$87,289,000
Income of consolidated companies	$ 2,611,000
Equity in net income of unconsolidated subsidiary	290,000
Net income	$ 2,901,000

Argonaut and consolidated subsidiaries do not file separate tax returns but are included in the consolidated returns of Teledyne, Inc. The income tax credits related to the 1973 tax loss were reflected in Argonaut's 1973 consolidated financial statements since the loss could have been carried back to recover prior years' taxes on a separate return basis. In 1974, no income tax credit has been included as the losses could not have been carried back by Argonaut.

(14) Subsequent events. In January, 1975, the Company accepted 1,884,813 shares of its common stock which were tendered pursuant to a December, 1974 offer by the Company to exchange its 10% Subordinated Debentures Due 2004, Series A, for shares of its common stock at the rate of $16 principal amount for each share tendered. The offer expired January 6, 1975. Subsequent to the date of the auditors' report, the Board of Directors declared a 3% common stock dividend payable May 26, 1975, to shareholders of record March 31, 1975. The financial statements and related notes have not been adjusted to reflect these events.

Revenue by Line of Business

(000's Omitted)

	Year Ended October 31				December 31,
	1970	*1971*	*1972*	*1973*	*1974*
Industrial	$ 424,266	$ 375,990	$ 404,262	$ 487,775	$ 599,604
Aviation and Electronics	379,964	331,479	366,515	408,899	433,180
Specialty Metals	285,450	263,815	287,152	375,706	487,013
Consumer and Other	126,768	130,588	158,062	183,119	180,190
Consolidated Sales	1,216,448	1,101,872	1,215,991	1,455,499	1,699,987
Insurance and Finance	392,423	446,620	512,621	601,488	732,318
Total	$1,608,871	$1,548,492	$1,728,612	$2,056,987	$2,432,305

Net Income by Line of Business

(000's Omitted)

	Year Ended October 31				December 31,
	1970	*1971*	*1972*	*1973*	*1974*
Industrial	$ 14,925	$ 14,280	$ 15,704	$ 14,158	$ 32,585
Aviation and Electronics	14,988	6,360	8,344	12,684	10,580
Specialty Metals	11,224	7,176	8,068	15,744	22,344
Consumer and Other	5,587	4,491	1,085	(1,827)	(493)
Consolidated Companies	46,724	32,307	33,201	40,759	65,016
Insurance and Finance	15,140	23,872	24,243	24,604	(33,879)
Total	$ 61,864	$ 56,179	$ 57,444	$ 65,363	$ 31,137

In 1974, the net income of the Industrial group includes $12,196,000, after taxes, of gain on sale of assets related to that line of business. Except as noted, long-range trends in revenue and profitability for the above lines of business have reflected general economic conditions. The net loss in the Consumer and Other group for 1973 was caused in substantial part by costs incurred in an effort to expand the sales of television and stereo products. The net loss in this group declined in 1974, primarily as a result of a substantial reduction in production of these home entertainment products. Improvements in the Specialty Metals and Industrial groups are attributable to the generally high level of industrial activity and improved demand during the year. The decline in net income of the Aviation and Electronics group is primarily due to decreased profitability of certain products within the group. The net loss of the Insurance and Finance group resulted primarily from losses on malpractice liability coverage and from increased losses on sales of investments.

Industrial

Teledyne offers a wide variety of products, services and expendable materials that are used for industrial purposes. A major area of this activity is the manufacture of air and water-cooled gasoline and diesel engines. These range from small, lightweight units widely used in lawn mowers, garden tractors and generators, to heavier units used in construction machinery and materials handling vehicles. The largest engines produced are heavy-duty, high-performance types used in military vehicles.

Machinery and related tooling used in virtually every manufacturing industry, to produce products of every type, is another major category. This includes machines for thread cutting, grinding, cut-off, gear-rolling, tube bending and forming, pressing, can-making, assembly of complex products, and manual and automatic welding of various types. Other types of automatic equipment are made for the bakery and chemical industries. In addition to machinery, Teledyne produces many types of dies, tool bits and other expendable tooling, as well as a complete line of welding rod and wire in various alloys.

Teledyne is also active in the area of geophysics, providing instruments and services for seismology, oceanography, meteorology, pollution monitoring, rock and soil mechanics, and structural dynamics. One specialty is geophysical exploration to locate oil deposits on land and beneath the sea for major oil companies. Another is the fabrication and emplacement of off-shore oil production towers, and contract off-shore drilling workover. Off-shore drilling took place during the year in the Gulf of Mexico and in Southeast Asia.

Other miscellaneous industrial products and services include molded rubber products such as solid rubber tires for materials handling equipment and automotive rubber products excluding tires. In the nuclear field, Teledyne provides instruments and services for the detection, monitoring and analysis of radioactive materials, and thermoelectric generators for space and terrestrial use.

Aviation and Electronics

Teledyne is one of the world's leading producers of piston engines for the general aviation industry. Small turbojet engines for use in manned and unmanned aircraft, and in recently-developed turbojet-powered missiles, are manufactured as well.

The company also specializes in the design and fabrication of unmanned remotely piloted aircraft that are widely used as military target systems and in aerial surveillance, and provides support services for these products.

A broad range of products is made for commercial, military and general aviation aircraft. Among these are batteries, avionic devices and instrumentation, hydraulic fittings and hydraulic and pneumatic actuating systems, explosive-energy actuating devices and emergency aircraft escape systems.

Electronic activities include the manufacture of solid-state semiconductor components ranging from individual semiconductor integrated circuits through larger micro-electronic assemblies which may encompass the complete functions of a micro- or mini-computer. Other electronic components include traveling wave tubes and amplifiers, related microwave components, wire, cable harnesses and hardware.

Complete electronic systems for navigation, guidance, control, reconnaissance, information processing, electronic counter measures, computing, automation, monitoring, communications, radiolocation and telemetry are also designed, developed and manufactured by Teledyne.

Specialty Metals

Teledyne produces many specialty metal alloys that have precise metallurgical properties for use in various critical applications. Zirconium and hafnium are produced for use in the nuclear power generation industry as featured in this Teledyne Report. Zirconium is also widely used as the active agent in photographic flash bulbs and in the fabrication of equipment for the chemical industry, because of its corrosion resistance.

Tantalum is produced for use in the manufacture of electrical capacitors, and columbium for various aerospace applications. Molybdenum and vanadium are widely used as alloying ingredients in various types of high quality steel.

Titanium is produced as ingot, bloom, billet, bar and coil and finds widespread use in the aerospace industry where its strength and light weight are important.

Teledyne is also a specialist in the development and production of high speed and alloy steels for tools, dies, bearings, gears and specialized aerospace hardware.

Double vacuum-melted superalloys are produced for applications where high strength at high temperatures is required. The major use of these alloys is in aircraft jet turbine blades and related parts.

Sintered carbides of tungsten and other metals are produced for use in cutting tools, dies and wear-resistant surfaces in metal-working, mining and other industries.

In addition to producing metals, Teledyne also reduces various ferrous and non-ferrous alloys to finished forms such as thin and ultrathin rolled metal strip, cold-finished bar and shafting, cold-drawn seamless and welded tubing, roll-formed shapes, forgings and castings.

Consumer and Other

Consumer product activities of Teledyne range from product development and manufacture to retailing and servicing.

During the year, manufacture of Water Pik* Oral Hygiene devices was supplemented by the introduction of the Shower Massage by Water Pik, a shower head that can be adjusted to give a conventional or a pulsating spray of water. Olson Electronics operates a chain of 80 stores in 15 states and a mail-order service for the retailing of electronically oriented products to the consumer for home use.

Teledyne Service Company has centers in 18 states for the servicing of electronic home entertainment products and appliances.

Other consumer activities include the manufacture of AR speakers by Acoustic Research for sale in the domestic and international markets. Teledyne Laars manufactures swimming pool heaters and other equipment to heat buildings and supply hot water for commercial users.

Dental equipment, instruments and consumable products used by dentists, dental laboratories and dental schools are also manufactured and supplied by Teledyne.

Insurance & Finance

Argonaut Insurance Company and Teledyne's other casualty insurance companies write a broad line of insurance including workmen's compensation, liability, automobile, and fire insurance.

Unicoa Corporation, 91% owned by Teledyne, writes life and health and accident insurance. Fireside Thrift, a consumer finance company, operates in the states of California and Hawaii.

*Trademark

Consolidated Summary of Operations

For the Four Years Ended October 31, 1973 and the Year Ended December 31, 1974
(000's Omitted)

	Year Ended October 31 (Note E)				December 31,
	1970	*1971*	*1972*	*1973*	*1974*
Consolidated sales	$1,216,448	$1,101,872	$1,215,991	$1,455,499	$1,699,987
Consolidated gross profit	$ 263,008	$ 218,866	$ 237,271	$ 284,152	$ 327,005
Consolidated interest expense (Notes A and B)	$ 9,915	$ 7,337	$ 6,969	$ 17,338	$ 16,293
Consolidated provision for currency translation (Notes A and B)	$ —	$ —	$ —	$ 6,275	$ 5,110
Consolidated provision for income taxes	$ 48,400	$ 29,400	$ 31,800	$ 41,600	$ 66,500
Income of consolidated companies (Note D)	$ 46,724	$ 32,307	$ 33,201	$ 40,759	$ 65,016
Equity in net income (loss) of unconsolidated subsidiaries, after allocated expenses and income tax credits (Notes A and B)	15,140	23,872	24,243	24,604	(33,879)
Net income (Note D)	61,864	56,179	57,444	65,363	31,137
Dividend requirements of preferred stock	5,780	4,649	3,791	3,684	3,662
Net income applicable to common shareholders	$ 56,084	$ 51,530	$ 53,653	$ 61,679	$ 27,475
Net income per share of common stock and common stock equivalents (equal to net income assuming full dilution—Note C)	$1.69	$1.49	$1.58	$2.45	$1.33
Adjusted for 3% common stock dividend payable May 26, 1975 (Note F)	$1.64	$1.45	$1.53	$2.38	$1.29

The Company has paid 3% stock dividends applicable to the common stock during each of the years presented above; no cash dividends have been paid on the common stock.

Notes to Consolidated Summary of Operations

(A) Interest expense was $23,016,000 in 1970, $18,963,000 in 1971, $20,618,000 in 1972, $37,104,000 in 1973, and $37,785,000 in 1974, of which $13,101,000 in 1970, $11,626,000 in 1971, $13,649,000 in 1972, $19,766,000 in 1973, and $21,492,000 in 1974 was allocated to unconsolidated subsidiaries. Interest expense on long-term debt and subordinated debentures was $18,268,000 in 1970, and approximated total interest expense in 1971, 1972, 1973 and 1974. In 1973 and 1974 the Company provided for the estimated effect of changes in exchange rates applicable to long-term debt repayable in foreign currencies.

(B) Interest expense was allocated to unconsolidated subsidiaries based on Teledyne's average cash investment, including net intercompany balances, in these subsidiaries of $140,100,000 in 1970, $162,600,000 in 1971, $184,600,000 in 1972, $199,100,000 in 1973 and $190,400,000 in 1974. Beginning in 1973, the Company also allocated interest expense to unconsolidated subsidiaries relating to a portion ($49,000,000 in 1973 and $57,500,000 in 1974) of the investment in the Company's treasury stock based on the ratio of its equity represented by its average investment in unconsolidated subsidiaries to average total equity. Interest rates for allocated interest averaged 8.8% in 1970, 7.3% in 1971, 7.5% in 1972, 8.2% in 1973 and 8.5% in 1974. The provision for currency translation relating to long-term debt was allocated on the same bases as interest expense.

The Company's equity in net income of its unconsolidated subsidiaries includes net realized gains (losses) on sale of investments of $2,226,000 in 1970, $602,000 in 1971, $(1,071,000) in 1972, $(624,000) in 1973 and $(25,611,000) in 1974. In 1973, Unicoa's unrealized loss on investments increased $1,122,000 from $27,116,000 to $28,238,000; in 1974, it increased $25,424,000 from $30,594,000 to $56,018,000. In 1973, Argonaut's unrealized gain on investments increased $8,819,000 from $11,971,000 to $20,790,000; in 1974, the unrealized loss increased $89,520,000 from $1,088,000 to $90,608,000.

Teledyne owned 60.4% of Unicoa at September 30, 1970, 67.4% at September 30, 1971, 85.1% at September 30, 1972, 90.2% at September 30, 1973 and 90.9% at December 31, 1974. The Company owned 100% of Argonaut Insurance Company for all periods presented.

(C) Net income per share is based on the weighted average number of shares of common stock and common stock equivalents outstanding during each year (35,509,285 in 1970, 36,325,486 in 1971, 35,088,278 in 1972, 25,872,770 in 1973 and 21,755,141 in 1974), including all convertible debt, Series B preferred stock and all dilutive options and warrants. Each common stock equivalent has been considered outstanding from the beginning of each year or date of issuance, and the related dividend requirement or interest has been eliminated.

(D) In 1974, the Company extended its use of the last-in, first-out method of valuing inventory in order to reflect more accurately the results of operations by matching current costs against current revenues. As a result, income of consolidated companies and net income were reduced by $6,400,000, or $.29 per share, in 1974. Since inventories at the beginning of 1974 are the base inventories under the last-in, first-out method, there is no effect on the results of operations of prior years.

The Company repurchased $9,097,000 and $59,071,000 face amount of its long-term debt and subordinated debentures in 1973 and 1974, respectively, with the resulting gains included in the results of operations. These transactions resulted in an increase in net income of $1,424,000, or $.06 per share, in 1973, and $2,555,000, or $.12 per share, in 1974. In 1974, the Company realized a gain of $12,196,000, or $.56 per share, after taxes, on the sale of assets of consolidated companies.

(E) In 1974, the Company changed its fiscal year end from October 31 to December 31. The results of operations for the two months ended December 31, 1973, which have been credited to retained earnings, are summarized in Note 2 to the Consolidated Financial Statements.

(F) In March, 1975, the Board of Directors declared a 3% common stock dividend payable May 26, 1975, to shareholders of record March 31, 1975.

Management's Discussion and Analysis of the Summary of Operations

Consolidated sales increased in 1973 and 1974, primarily due to general economic conditions and to improved demand in the industrial products and specialty metals markets. Consolidated gross profit rose in line with the increase in consolidated sales. Additional comments regarding operations by line of business are on page 24 of this report.

Approximately 85% of the increase in total interest expense in 1973, discussed in Note A to the Consolidated Summary of Operations, is the result of new debt incurred late in fiscal 1972 and during fiscal 1973.

In 1973 and 1974 the Company provided for the estimated effect of changes in exchange rates applicable to long-term debt issued late in fiscal 1972 and during fiscal 1973 and repayable in foreign currencies.

The consolidated provision for income taxes increased in 1973 and 1974 due to higher pre-tax income and to changes in the effective tax rates. The effective rate increased over the 1972 level primarily due to higher state tax rates. In 1974, the favorable effect of having a greater portion of pre-tax income taxed at lower capital gains tax rates was offset by the inclusion in pre-tax income of a larger amount of costs and expenses which are not deductible for tax purposes.

As discussed in Note D to the Consolidated Summary of Operations, the results of operations include the effect of valuing additional inventories using the last-in, first-out method in 1974, gains on repurchase of debt in 1973 and 1974, and a gain on sale of assets of consolidated companies in 1974.

In 1973, consolidated maintenance and repairs, depreciation of property, plant and equipment, payroll taxes and rents increased as operations were expanded to meet increased product demand.

In 1974, adverse underwriting results were experienced by the property and casualty insurance group of unconsolidated subsidiaries. The major cause of these results was the heavy losses incurred in the medical malpractice coverage written by Argonaut Insurance Company. In addition, as discussed in Note B to the Consolidated Summary of Operations, increased losses on sales of investments and increases in unrealized losses were incurred by the unconsolidated subsidiaries during 1974.

Summary of 1974 Operations by Quarter

(000's omitted)

	Quarter Ended (Note A)			
	March 31, 1974	*June 30, 1974*	*September 30, 1974*	*December 31, 1974*
Consolidated sales	$405,380	$427,555	$426,807	$440,245
Consolidated provision for income taxes (Note C)	$ 9,100	$ 13,200	$ 21,400	$ 22,800
Income of consolidated companies (Note B)	$ 8,689	$ 12,771	$ 27,587	$ 15,969
Equity in net income (loss) of unconsolidated subsidiaries	9,941	2,605	(13,575)	(32,850)
Net income (loss) (Note B)	$ 18,630	$ 15,376	$ 14,012	$(16,881)
Net income (loss) per share of common stock and common stock equivalents (equal to net income assuming full dilution)	$ .75	$ .63	$ .69	$(.74)
Adjusted for 3% common stock dividend payable May 26, 1975	$ .73	$ .61	$ .67	$(.72)

NOTES:

(A) In order to reflect more accurately the results of operations by matching current costs against current revenues, the Company, in 1974, extended the use of the last-in, first-out (LIFO) method of valuation to additional inventories formerly valued under the first-in, first-out (FIFO) method. The effect on the quarter and year ended December 31, 1974 was to decrease income of consolidated companies and net income by $1,900,000 ($.09 per share) and $6,400,000 ($.29 per share), respectively. The adjustment to the first three quarters of 1974 (reflected in the amounts presented above) for inventories changed to LIFO during the fourth quarter was to decrease income from consolidated companies and net income by $1,300,000 ($.06 per share), $600,000 ($.02 per share), and $200,000 ($.01 per share), respectively, from previously reported amounts. Since inventories at the beginning of the year are the base inventories under the LIFO method, there is no effect on the results of operations of prior years.

(B) During the quarter ended September 30, 1974, the Company realized a gain of $11,744,000 ($.53 per share) after taxes on sales of assets of consolidated companies.

(C) The higher effective tax rate in the quarter ended December 31, 1974 is due primarily to costs and expenses recorded in that quarter which are not deductible for tax purposes. The lower effective rate in the quarter ended September 30, 1974 is due to the application of lower capital gains tax rates to the gain discussed in Note B.

Stock Price and Dividend Summary

	1973				*1974*			
Quarters	*1st*	*2nd*	*3rd*	*4th*	*1st*	*2nd*	*3rd*	*4th*
Common Stock*								
High	19⅜	15⅞	15⅛	16½	14⅛	15	14⅝	11⅛
Low	14⅝	11¼	11½	9¼	11⅞	10¾	9¾	7⅝
Dividend		3% Stock Paid in March				3% Stock Paid in April		
Preferred Stock *$6 Cumulative Convertible Preferred Series*								
High	78	73¼	71	72	67½	68¼	59	55
Low	72	69¾	64¼	63	63½	59	46¼	47
Dividend	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
Preferred Stock *Cumulative Convertible Preferred Series B*								
High	57½	No Bid	35	34	38	42	36	No Bid
Low	54	No Bid	35	34	38	36	36	No Bid
Dividend	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80

**Prices have been adjusted for stock dividends except for the common stock dividend payable May 26, 1975.*

Teledyne Common Stock and $6 Cumulative Convertible Preferred are listed on the New York and Pacific Coast Stock Exchanges. The Series B Preferred is traded in over-the-counter market.

The over-the-counter quotations set forth herein have been furnished by the National Quotation Bureau, Incorporated, are inter-dealer prices and do not include mark-ups, mark-downs, commissions or other adjustments except as noted. They are bids only and do not represent actual transactions.

TELEDYNE, INC.

Board of Directors

HENRY E. SINGLETON, *Chairman and Chief Executive Officer, Teledyne, Inc.*

ROBERT C. JACKSON, *Honorary Chairman, Teledyne Ryan Aeronautical*

GEORGE KOZMETSKY, *Dean of the College of Business Administration of the University of Texas*

GEORGE A. ROBERTS, *President, Teledyne, Inc.*

ARTHUR ROCK, *Private Investor*

CLAUDE E. SHANNON, *Donner Professor of Science at Massachusetts Institute of Technology*

Officers

HENRY E. SINGLETON, *Chief Executive Officer and Chairman of the Board of Directors*

GEORGE A. ROBERTS, *President*

ROBERT S. BELL, *Vice President*

A. V. HOLMLUND, *Vice President*

JERROLD V. JEROME, *Vice President and Treasurer*

FREDERICK A. KAUFMAN, *Vice President*

RUSSELL L. KIERNAN, *Vice President*

LEO W. KILLEN, *Vice President*

G. WILLIAMS RUTHERFORD, *Vice President*

TECK A. WILSON, *Vice President*

THEMISTOCLES G. MICHOS, *Secretary*

Corporate Offices

1901 Avenue of the Stars

Los Angeles, California 90067

Transfer Agents

Bank of America N.T. & S.A.

Corporate Agency-Service Center

P.O. Box 37002

San Francisco, California 94137

United States Trust Company of New York

45 Wall Street

New York, New York 10005

Registrars

Security Pacific National Bank

One Embarcadero Center

San Francisco, California 94111

First National City Bank

111 Wall Street

New York, New York 10015

TELEDYNE, INC.