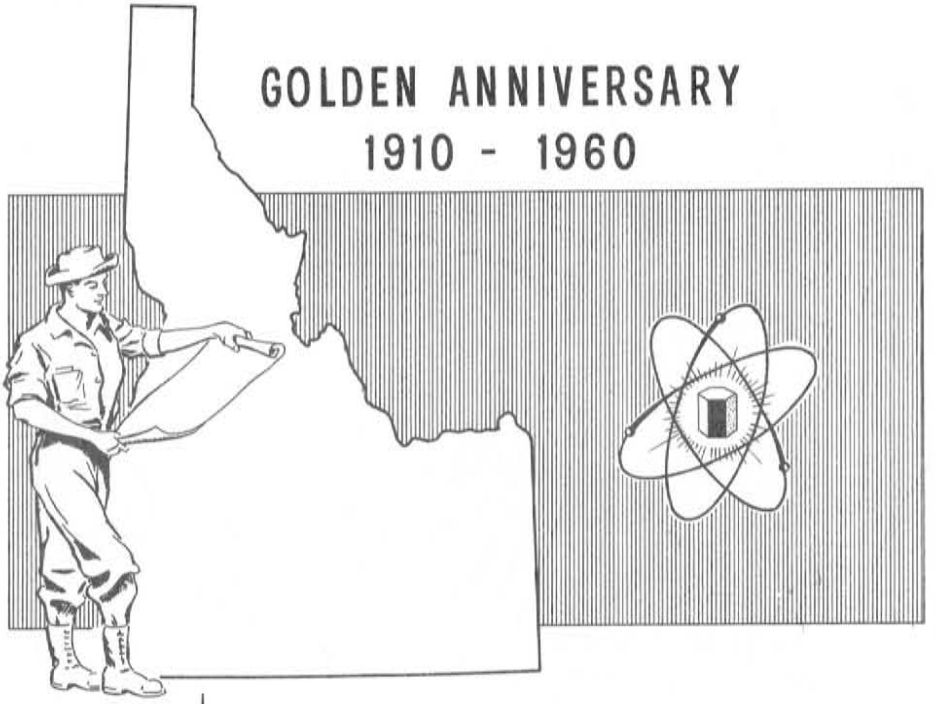
FIFTY YEARS OF
PROFESSIONAL ENGINEERING
IN IDAHO



GOLDEN ANNIVERSARY
1910 - 1960

IDAHO SOCIETY
OF PROFESSIONAL
ENGINEERS

IDAHO
SOCIETY OF
PROFESSIONAL
ENGINEERS
1910

SUMNER M. JOHNSON, P. E.
President Idaho Society of Professional Engineers
February 1959-February 1960

Your Part

It is with great pride that we review the advancement of the engineering profession over the last fifty years and see the important part that our Idaho Society of Professional Engineers has contributed to this effort.

As you review this fiftieth anniversary publication, I am certain you will reflect that as our Society has grown, so has the stature of the professional engineer grown. But let us not live on the laurels of the past.

We as a Society, in the interest of all mankind, as well as the engineering profession, should be looking at new horizons and even greater goals of professional development. Therefore, I charge each and every one of you, as members of the engineering profession, to accept this responsibility and do your part in the advancement of professionalism.

Sumner M. Johnson, P.E.
President, I.S.P.E.

DARWIN A. UTTER

Founder of Professional Engineering in Idaho

By W. P. Eaton, P.E.

Darwin A. Utter, founder and first President of the Idaho Society of Professional Engineers, came west in 1889 and settled in Weiser. He engineered the original Weiser power, water and sewer systems and adjacent irrigation works. In 1908, Engineer Utter was appointed Surveyor General for Idaho. While serving as Surveyor General, he made a study of desirable changes to improve the methods for the survey of public lands which had been in use for over a hundred years. He was virtually the author of the law which governs the practice at present. Brass cap markers for corners and surveys by government forces rather than by contract were two of the changes made. In 1913, he was employed by a syndicate to spend several months in the Orient and Phillippines to investigate and report on natural resources. In 1916, he accepted the office of Deputy U. S. Land Commissioner at Mountain Home and had an office there for the balance of his life.

Prior to the Spanish-American War, Engineer Utter was commissioned as a secret service agent for the U. S. Government. In that capacity, he visited all the important seaports in the world.

Past Presidents

Presidents	Years
Darwin A. Utter	1910-11
Dan G. Martin	1912
J. P. Congdon	1913
Ern G. Eagleson	1914
Barry Dibble	1915
Fred Wilkie	1916
Will Gibson	1917
W. O. Cotton	1918
G. C. Scharf	1919
Inactive Period	1920-36
J. P. Congdon	1937
Wm. P. Hughes	1938-39
W. P. Havenor	1940
R. J. Briggs	1941-42-43-44
C. P. Humphrey	1945
James Reid	1946
L. E. Stalker	1947
Orland C. Mayer	1948-49
Allen S. Janssen	1950-51
Ellis L. Mathes	1952
Jay E. Painter	1953
G. A. Riedesel	1954
C. C. Hallvik	1955
Joseph Lattimore	1956
Earl C. Reynolds	1957
Franklin E. Smith	1958
Sumner Johnson	1959

A History Of Professional Engineering In Idaho

By R. A. MAULE, P.E.

THE EARLY YEARS

Prior to the formation of any engineering group in Idaho, much engineering activities transpired. Ditches had to be graded and mining claims surveyed. Work was done on the New York Canal by Major A. D. Foote and John Sherman of New York in the early eighties. In the nineties, work was progressing on land surveys, irrigation ditches, and in the mines. Idaho has had an official State Engineer since 1895.

In the summer of 1908, Darwin A. Utter, Surveyor General for Idaho, requested by letter that all County Surveyors, City and Irrigation Engineers in the State meet in Boise to form a society of Engineers and Surveyors. At this meeting, officers were elected, dues decided upon and an Executive Committee appointed. This constituted the birth of the Society.

The next meeting was held the following January to perfect the organization and begin an active program. It was well attended and future plans were made. The same officers were re-elected. The meeting was climaxed with a grand banquet.

The Second Annual Meeting was held in Twin Falls on Feb. 19, 1911. A train was chartered for a trip to Salmon Dam. At the end of the year, 143 active members were listed with three honoraries. Three well attended meetings with formal programs were held during the year.

The third annual meeting was held in the Capitol Building at Boise from February 22 to 25, 1912. Governor Hawley made the welcoming address. On the final day, a field trip was made to Arrowrock and Diversion Dams. A Code of Ethics was adopted. A photograph of 46 members appears in the annual journal. Dan G. Martin was elected President of the Society. Five meetings were held during 1912 with one at Twin Falls. Membership increased to 174. The Society began to concern itself with legislation.

Weiser was the scene of the Fourth Annual Convention which was held February 20-23, 1913. A field trip to the Oxbow Hydroelectric Power Development was made by special train. About one hundred members made the trip.

Secretary Ira Shaffner, with the help of Don Davis, began the issue of a monthly bulletin. This was illustrated and bound, and nicely printed. It was distributed free to all members.

By 1919, there had been 278 certificates of membership issued. The last meeting on record of the old society appears to have been held April 20, 1918, although other meetings were held later.

Legislation:

Three bills were prepared and presented to the 1913 session of the Legislature. A bill to establish a State Highway Commission became law. A bill to license engineers and regulate their private practice was passed unanimously by both houses, but was vetoed by the Governor. The Engineers License Bill was submitted to the 1915 and 1917 sessions and was finally enacted in 1919. It appears that land surveyors had to be licensed after 1903.

THE PERIOD WITH A.A.E. (1920-1937)

Upon petition of the Idaho Society of Engineers, the American Association of Engineers granted a charter and the Idaho Society became a Chapter. The charter was received on November 21, 1919. The identity of the Idaho Society of Engineers was thereby lost except for a joint meeting with the Idaho Irrigation Congress on January 12-14, 1920.

The affiliation proved disappointing as the A.A.E. became inactive and by 1930, had virtually disappeared.

THE PRESENT ERA

Activities:

The situation was surveyed in the fall of 1936. No national policy seemed to be doing what appeared to be vital to some of our more pertinent Idaho problems.

On April 3, 1937, about 45 engineers and architects from twenty counties assembled in Boise. Mr. Raymond J. Briggs presented the old constitution and by-laws of the Society with the suggested amendments and additions. The name, seal, pin, constitution, and by-laws of the old society were unanimously adopted. Several of the old Society members were present and supported the move.

Copies of the new amended constitution and by-laws were distributed. The first officers of the reorganized society were elected May 8, 1937. The President was instructed to appoint a committee to nominate engineers to the Department of Law Enforcement for selection of engineering examiners. It is interesting to note that the Department followed the suggestion by naming the Board from this list. Another highlight was the inclusion of architects in the Society.

An annual meeting was held at Hotel Boise on April 30, 1938. Election of officers was held. Three sections were set up—the Northern, Southwest and Southeast. Considerable time and effort were put into preparation of an Engineer's Registration Act to be presented to the 1939 Legislature.

In 1939, a committee study and report was made on engineers' salaries in Idaho in comparison with other states. In 1942, the President's Council, made up of all living past presidents of the Society, was created.

In 1943, an attempt was made to replace the head of a highway engineering department with an unqualified, unlicensed man. A Society motion was made and unanimously passed that the Society's elective officials, as a committee, carry through the protest against men not qualified under the Idaho Engineer's Law assuming engineering duties in the Department of Public Works. This committee was instructed to carry this protest to such lengths as might be required.

In 1946, a special committee outlined steps and procedure to make the Society available as a "Bargaining Agency" for engineers, if it should become desirable.

In 1947, a committee urged affiliation with N.S.P.E.

On September 1, 1948, the Society voted to become affiliated with N.S.P.E. The name "Idaho Society of Engineers" was changed to "Idaho Society of Professional Engineers" in 1949.

A recommended minimum fee and salary schedule for engineers was adopted, published and distributed in 1952.

In 1953, Orland Mayer was elected Vice-President of N.S.P.E. to represent the Western Area.

The Society became incorporated under the laws of Idaho in 1955.

A salary study was completed in 1956. Services of the Society were made available to aid engineers in obtaining better compensation. A resolution was passed which enumerated a desirable procedure to be followed to improve on present land survey practices.

Legislation:

At the 1938 meeting, the Legislative Committee made a brief formal report on its work. Principle recommendations called for use of the "model engineer law" as a basis of a new Idaho engineer code, more widespread study of engineer needs, and investigation into all circumstances and conditions in which the public is concerned with the work and activity of the engineer.

On March 11, 1939, Governor Bottolfson signed House Bill No. 182, the engineer law. This was the first major engineer legislation introduced since 1919.

Further details on the processing of this legislation are included in another portion of this publication.

In 1941, the Hughes report was printed. This compared engineers' salaries in the Idaho Department of Highways with those in other states. Copies were sent to the Governor and Legislature.

In 1942, active members helped finance a Public Works Commission Act, which was designed to place the Highway Department under bi-partisan management, and establish a merit system for all employees in that department. Clyde P. Humphrey was Chairman of the committee preparing the proposed legislation. In 1943, the final draft was approved by the members, but it was decided not to get it into the Legislature until after the War.

Our "Public Works Commission Act" was presented to the State Affairs Committee in the State Senate for introduction in 1945. It never got out of committee. In 1947, another effort to get it enacted was futile.

In 1949, funds were appropriated retaining an outside agency to make a study of the Highway Department and prepare recommendations. Public Administrations Services of Chicago was retained for this job.

The "Highway Act of 1951" was enacted by the Legislature. This followed very closely the recommendations of the "Highway Report". The resulting "Board of Highway Directors" and most of the contents of the law are very similar to provisions in our "Public Works Commission Act", which triggered the whole idea.

Legislation was sponsored in 1957 asking for a referendum vote to change the office of County Supervisor from an elective office to an appointive office, and setting up qualifications for surveyor. This measure failed to pass, but a similar measure passed the 1959 Legislature. The voters will have an opportunity in 1960 to change the State Constitution.

A Look Ahead

By projecting the present membership of I.S.P.E. fifty years ahead at the rate of population increase, it was found that the I.S.P.E. would have over 1,000 members in the year 2010. Other factors such as proportionately greater need for engineers due to more advanced technology may increase the I.S.P.E. membership even higher. This will make the organization more powerful and therefore enable it to achieve its goals with more force and impact.

A Tribute To Our Early Members

The surviving early members of the Idaho Society of Engineers have contributed greatly to the profession and to society. We wish to pay tribute to these far-sighted founders of Professional Engineering in Idaho and to present a resume of their present activities for the benefit of their many friends and fellow engineers who are greatly interested in them.

A. P. Adair is a prominent Consulting Engineer with headquarters in Boston.

Abe N. Ashline has spent most of his professional years with the Idaho Highway Department from which he retired in 1957. He was also associated with the U. S. Bureau of Reclamation for a few years in between times. Abe lives in Boise.

Murray D. Bagley spent forty-three and a half years with the U. S. General Land Office here in Boise. Since retiring from his full-time employment ten years ago, Murray has had a wonderful time developing and operating an eighty acre farm in the fertile Wilder area.

E. V. Berg practiced Engineering in the Twin Falls area for a long time. His present whereabouts is not known.

Ellsworth Buchanan has worked around Boise most of the time. His latest em-

ployment was with the State Highway Department.

Samuel D. Clinton, first treasurer of the Idaho Society, resides in Pocatello. Sam has done Engineering for the City of Pocatello, Bannock County, the Idaho State Highway Department and in other states.

W. O. Cotton put in many successful years in Engineering practice in Southeast Idaho. He is now in the Insurance business in Idaho Falls.

John P. Congdon, one of Boise's most respected citizens, abandoned the actual practice of Engineering a great many years ago to go into the cold storage business. He has maintained an interest in the profession, however, and has always responded wholeheartedly whenever called on to give a lift. He has served as president of the Society on two occasions. The many committees he has headed up or served on have always delivered. As a Master of Ceremonies for our social functions, his dignity and poise are things to remember.

Lee R. Cooke has done a lot of Engineering and Architectural work during the past fifty years in the Nampa area. Lee has always been an enthusiastic and able booster for the Engineering profession and has given a lot of his time and energy in behalf of the Idaho Society in the past fifty years. He was treasurer of the original Society at the time it went into hibernation.

Barry Dibble has been another of the outstanding U. S. Reclamation men in Idaho's history. He did investigation and preliminary work for the American Falls Dam project and served for several years as Project Manager of the Minidoka Project. He has been a consultant for a long time and is still in business with offices in Redlands, California.

R. M. Ednie is in private practice in Nampa. He has served as Canyon County Surveyor for a number of years in the past.

Harry Hamming was available for surveys, subdividing, etc., in the Boise area for about forty years. He retired from Engineering work several years ago.

Walter R. Heyde was one of the pioneer Consulting Engineers in Idaho. One of his early accomplishments was to Engineer the King Hill Irrigation Project. When Idaho acquired a State Highway Department, he was one of the first Highway Engineers and remained in that organization until his retirement in 1954.

Fred W. Kiefer of Blackfoot has devoted a great deal of his professional efforts to the development of that city and the surrounding area.

W. G. Sloan devoted a great deal of his professional endeavors working for the U. S. Bureau of Reclamation here in Southern Idaho. When the Department of the Interior and the Army Engineers each had a plan for the development and control of the Missouri River Basin, a joint plan was worked out by General Pick of the Army Engineers and W. G. Sloan of the Bureau of Reclamation. Actual work in accordance with this plan has been underway for several years. Engineer Sloan now resides in San Diego.

Gordon C. Smith, first Secretary for the Idaho Society of Engineers, has probably made more mineral surveys than any other Engineer in the state. He was Ada County Surveyor for a long, long time and retired from that office an undefeated champion in January, 1959.

James Spofford, Sr., was Engineer Manager for the Mountain Home Irrigation District for several years after which he became associated with the U. S. Bureau of Reclamation as Manager of the Owyhee Project.. He is now retired and living in Boise.

Sam E. Vance, Jr., served as Engineer for the Hillsdale Irrigation District in the Magic Valley for twenty-six years, and is still retained as their consultant. He has been serving as Executive Secretary for the Idaho Veterans Affairs Commission since 1946.

Engineering Education In Idaho

By
Paul Mann & Allen Janssen

In the beginning, there was — "The Engineering Building, built in 1901-02, is a commodious structure of brick, three stories high, with a ground plan of 60 x 108 feet. At present, the Mechanical and Electrical Engineering departments, as well as Chemistry, Geology and Physics are here located. It also contains the machine and woodworking shops and the boilers and engines which supply heat and power to this building and to Ridenbaugh Hall."

Here, quoted from the University of Idaho catalog for 1909-1910, are details of the center of engineering education in the state as the Idaho Society of Professional Engineers was being organized in 1910. Civil Engineering is missing in the description because at that time it was located elsewhere, in the Administration Building. Mining Engineering was also in existence as a part of the School of Engineering but it was located in the Metallurgical Laboratory.

The same catalog in 1910 listed also a curriculum in Chemical Engineering, complete with four years of required work, but there seems to have been no degrees actually offered until shortly thereafter.

The 1910 senior class in engineering numbered twelve, seven of whom were in Mining Engineering.

While the above describes briefly the state of engineering education in 1910, it is necessary to point out that its beginning was almost twenty years earlier before the turn of the century. The University of Idaho was founded in 1889, one year before Idaho became a state, as a land grant institution. As such, basic training in the central core of liberal arts and the sciences was to be provided along with training in the agricultural sciences and mechanics arts. The first graduating class in 1896 numbered four, two women and two men. Both of the men graduated in Civil Engineering and they were the first engineering graduates in the state. Engineering education in Idaho is therefore approaching 70 years of age.

Evolution through the fifty years since 1910 is a composite of improved facilities, expanding and continually changing curricula, capable and loyal faculty and interested alumni.

By the end of the first half of this period in 1935, additions to the campus such as the Science Hall and a central heating plant enabled Engineering to occupy their entire building. Very early in the period, a World War I "temporary" building was erected behind the Engineering Building to house the Materials Laboratory and the Electrical Engineering Laboratory. Laboratory work in Mechanical and Agricultural Engineering, as well as in Hydraulics, was offered in the old heating plant and in the old buildings of the International Harvester plant across town. Late in this period, a small Engineering Drawing Building was constructed to relieve growing congestion in the Engineering Building. Chemical Engineering Laboratory facilities were located in basement storage rooms in the Science Hall.

During the early part of the second twenty-five years, increasing enrollments posed serious problems and it was determined that new facilities should be constructed at a new location on the campus. C. L. Kirtley of the first graduating class of 1896 (and later a physician in southern Idaho) provided some funds in 1939 for a new laboratory building and this act resulted in the provision of additional funds by the state. The building was constructed in 1941 and bears his name. Located across campus from the old Engineering Building, the new structure, as the first of four such units, housed laboratories for Mechanical and Chemical Engineering as well as a Hydraulics Laboratory. Its

existence initiated the move to the new and present location of engineering facilities at Idaho. Congested conditions were rectified for the moment but World War II was near at hand.

As post-war enrollments swelled to record numbers, temporary buildings were added while more permanent facilities were planned and constructed. In 1950, a second laboratory unit was provided for Electrical Engineering and the space formerly occupied by it was made available for the Materials Testing Laboratory. In 1951, the first half of the present Engineering Building was placed in use and the whole family was nearly back together again. A little later, the old heating plant was remodeled to provide classrooms and additional laboratory space for Agricultural Engineering.

The old Engineering Building — after fifty years of use — was torn down and replaced by the new Home Economics Building. Surprising, even to old timers, was the "School of Mines" label on the stone archway, revealed when the old wooden Engineering Building sign was taken down.

Curricula evolved as the state of the art and science advanced. Mining left Engineering to become a part of the new School of Mines. Irrigation, farm mechanization and electrification and soil conservation developed needs for specialized training and Agricultural Engineering appeared. These changes occurred early in the fifty-year period.

Chemical Engineering, only a page in the book in 1910, became an active curriculum. Located first in the Chemistry Department, it gradually developed until it became a department itself in the College of Engineering.

In 1937, a new force appeared in engineering education. The Engineers' Council for Professional Development (ECPD) came into existence and began to accredit curricula. Now, national standards were available by which one could measure — and outside engineers and educators could inspect, evaluate and report. Idaho's curricula in Civil, Electrical and Mechanical Engineering were among the first in the nation to be inspected and accredited in 1938. The three curricula in the College of Mines were also inspected and accredited very soon afterwards. Increasing enrollments and additional faciltites and staff in Agricultural and Chemical Engineering permitted these curricula to be inspected and accredited in 1950.

Most obvious today, in comparing with the older curricula, is the necessary trend to more basic engineering and scientific plans of study. The multiplying equipment and processes in any one field makes impossible a complete coverage. Today's graduate must be well founded in principles and much of the application must be learned in the specific job he assumes later.

When one considers the people who have had a part in engineering education here in this half-century, the numbers are large. Many who were teachers only a short time, have moved on to make their work in other fields (Dr. David B. Steinman, for example). There have been others, however, who have through the years seen much of and been a part of the evolution of the period.

Dean E. H. Little served as an early leader from about 1901 until his death in the early 1920's. He was succeeded by Dean Ivan C. Crawford, who served from 1923 until 1937. Both men accomplished much during the early years.

Arriving in 1919, J. Hugo Johnson, head of Electrical Engineering, now retired, was for forty years an inspiring teacher and friend of engineering students.

The present Dean of the University's Graduate School, Dr. L. C. Cady, was an early Chemical Engineering graduate and teacher.

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ment a few years ago, guided his department from the days of the first scheduled plane to the age of the jets.

Student, teacher, Dean and President, J. E. Buchanan, now President of the Asphalt Institute, left his mark during the post-war period when many of the new buildings which now dominate the campus were erected.

Student, teacher and Dean from 1935 to the present time, Allen S. Janssen has also seen and been a part of the changing period.

Others presently on the staff have also been a part of the evolution. H. E. Hattrup, first as a student in 1923, and now head of Electrical Engineering, D. S. Hoffman, as a student in 1933 and now Professor of Chemical Engineering, and Paul Mann, student in 1934 and now Professor of Electrical Engineering, have all been closely associated with engineering education in Idaho in this period. And there are many others.

In 1959, the engineering graduating class at the University was over 140. Well over 2,000 students have graduated in engineering from the University since 1896; 95% of this total has graduated in the 50-year period from 1910; 50% or over 1,000, have graduated since 1947. Present undergraduate and graduate enrollment in engineering is approximately 950.

No account is complete without recalling the training given to engineers in high schools in this state and the engineering education offered by other institutions of higher learning such as Idaho State College, Boise Junior College and North Idaho Junior College.

What the next fifty years will offer, no one knows. In the past, the engineering profession in Idaho has demanded high standards of engineering education in the belief that those who would enter it should be well trained. In so doing, the profession itself is responsible in large part for the development and evolution that has taken place. If education is adjudged to be of reasonably high quality and if it is to continue so, the continued support of the profession must be available in the future. A strong profession means highest quality training or, in other words, such professional training results in a strong profession. One cannot exist without the other now or in the future.

The State Board Of Engineering Examiners

By Raymond J. Briggs, P.E.

In 1903 the Idaho Legislature enacted laws governing the licensing and practice of land surveying, adopting to some extent the then existing standards, including bond requirement, for Deputy U. S. Mineral Surveyor. Some of those first statutes are still part of our land surveying laws. By 1918 the burgeoning land reclamation projects, railroad building, expanding road construction and other factors of the then boom in the economy of Idaho; coupled with some occurrences of flagrant and costly engineering episodes clearly pointed out a need for some control of engineering and the Legislature passed a law, administered by the Department of Law Enforcement, requiring registration of civil engineers. This legislation was sponsored by the Idaho Society of Engineers which had been established in 1910 and flourished as an influential organization until the mid-1920's, at which time it became affiliated with the National Association of Engineers. Both organizations foundered, due to financial and organizational collapse of the national association. The I.S.E. became dormant by the early 1930's, with the then secretary, Captain Ayres, of the Boise Ayres' Book Shop, holding all receipts for payment of his arrearage in secretary salary.

In 1936, seven engineers convened in Boise to discuss re-organization of the Idaho Society of Engineers. John P.

Congdon was elected temporary president and Raymond J. Briggs, who had called the meeting, as temporary secretary. Two objectives were adopted:

1. Re-organize I.S.E. into a virile organization whose influence would be potent and whose survival would be assured;
2. Sponsor a new engineer law, based on the 1936 issue of the "model law". The secretary was instructed to conduct an "extraction operation" of the I.S.P.E. from the national association.

This order was accomplished, I.S.P.E. formally re-organized and the first membership certificates of the Idaho Society of Engineers, as re-organized, issued in April, 1937 and signed by the first temporary president and secretary, who had been later elected as the first accredited officers. In 1938, the secretary, Raymond J. Briggs, was instructed to draft a new engineer law, based on the "model law". This was done and the draft approved by I.S.E. and then turned over to Oliver O. Haga, Attorney, for putting into form as a bill. The bill was introduced into the Legislature, as a House bill, in January 1939, and finally passed, with one amendment that exempted mining engineers. William P. Hughes, then I.S.E. president, came to Boise for several days to aid the legislative enactment. Many other engineers also contributed to the successful effort.

In early 1939, the I.S.E. was polled by mail ballots for recommendations as to membership of the first Board of Engineering Examiners under the new law. From the returns of the ballots, Governor C. A. Bottolfsen appointed the five men who had the highest number of votes. Thus, in June 1939, the Board was organized by members: William P. Hughes; H. R. Flint; R. J. Newell; Jessie E. Buchanan; Raymond J. Briggs. First officers were Hughes, Chairman; Newell, Vice-Chairman; Briggs, Secretary. Each of these engineers is still alive at this date. Buchanan, Flint, Newell and Hughes voluntarily retired from the Board, as in 1950 did Henry L. Senger, who succeeded Newell in 1940. Only one Board member has died—Mark R. Kulp, died June 9, 1958. The Board has had two secretaries: Raymond J. Briggs for the first 15 years and Orland C. Mayer, thereafter. Briggs, the present chairman, and past three-term president of I.S.E., is the sole survivor in office, of the original Board of Engineering Examiners.

The State Board of Engineering Examiners has two principal statutory duties. One has to do with licensing (registration) of engineers and land surveyors. The other is related to enforcement of the law. The first is a rather clear-cut duty, with not a great many uncertainties. The second one is almost the reverse in regard to difficulties. No one seems to know exactly the powers or responsibilities of the Board in regard to law enforcement, largely for the reason that the Board's powers and the pertinent statutes have not been ruled on by our courts in testing actions.

Reciprocity registration, for awhile a major problem, now has been developed into a much better situation; however, there remains several knotty problems and room for much improvement.

The character of many problems has changed remarkably in the past 20 years: whereas new ones are appearing and clamoring for solution as time moves on. With an average of four or less meetings per year, the Board has peculiar administrative problems, which is increasingly requiring more and more business by correspondence. Also, an increasing amount of work is passed to two major committees, the committee for qualifications and examinations, composed of Janssen and Wilson, has a heavy work load. The administrative committee, composed of Mayer, Mathes and Briggs, handles certain work items between

Board meetings. Assistant Secretary S. M. Barton, working under secretary Mayer, is handling several times more work than the secretary's office had to do ten years ago.

Board finances are a major controlling factor, and the budget put on us by the Legislature is not flexible enough to provide needed freedom of action in some categories, particularly in law enforcement.

The work of the National Council of State Boards of Engineering Examiners, Allen S. Janssen, President last year, is exerting a powerful and beneficial influence on engineering, nation-wide. All licensing boards in the U.S. has membership in N.C.S.B.E.E., through the medium of which much progress is being made toward more uniformity in legislation and registration. The National Society of Professional Engineers and the Idaho Society of Professional Engineers, Inc., are likewise significant factors in advancement of engineering stature. In effect, the membership of this Board is wholly controlled by I.S.P.E., which is as it should be.

With so few meetings per year, this Board would have had a much more severe problem in regard to accomplishment of its work, except for the relatively long terms of service by its members. No new member can become very well familiarized with Board work in a short time, due to infrequency of meetings and personally grappling with the host of different things to do and to be done. Service on the Board is laborious and expensive for each member, in both time and money, but rewarding in associations and duties performed.

TABULATIONS:

	1939	1959
Total Registered engineers:	287	849
Total Registered surveyors:	25	58
Engineers registered dur. yr.	19	64
License appli. dur. yr.	31	182

Engineers licensed since 1939—1271.

Mining Engineering Progress

By S. M. Barton, P.E.

On this fiftieth anniversary of Professional Engineering in Idaho and on the eve of Idaho's Centennial Celebration, it is well to consider the role that mining has played in the development of the engineering profession in Idaho as well as the overall economic development of the state.

Almost a hundred years ago, in 1861, when the number of white men in what is now Idaho could be counted on your hands, Captain Pierce persuaded a Nez Perce Indian to show him an occurance of placer gold on Orofino Creek at the present site of Pierce, Idaho. Pierce's rich discovery touched off a gold rush that quickly spread to other placer gold areas—Elk City, Florence, Warren, Salmon River, Rocky Bar, Idaho City and many other famous mining camps. Thus was mining in Idaho born, the direct consequence of which resulted in the birth of Idaho Territory carved from the original Washington Territory in the year 1861. Thousand of self-styled "mining engineers" flocked to the new goldfields from California, the South, and the North to reap the golden harvest. Agriculture and other economic pursuits followed in the wake of the mining rush, primarily to serve the infant mining industry. Thus, mining was responsible for the creation of most of our basic industries which flourish in Idaho today.

Within a few years, the famous Silver City deposits of horn silver were discovered, marking the beginning of true underground mining and ore processing in Idaho, and the need for real mining engineers began to be felt. Ninety-two years ago, Mr. John Adams, graduate of the Columbia School of Mines, was in charge of the first mine on the Poorman vein in the Silver City Mine District. He may well be the first college-trained engineer to work in Idaho. Smelting started in Ketchum as early as 1882.

Although gold was discovered in North Idaho by early explorers over a hundred years, ago, it was not until the Bunker Hill Mine was discovered by Noah Kellogg and his burrow in 1885 that real hard rock mining in the Coeur d'Alene Mining District began in earnest. The earlier placer deposits, gold veins, and silver veins of the area were eventually worked out; but the Bunker Hill lode still produces, after seventy-five years, such a large amount of lead and zinc that it is still ranked as the nation's leading producer of lead.

It is well to single out the Bunker Hill Mine as an example to show that it takes more than God-given ore to make a mine. Engineers have always dominated the policy and control of the Bunker Hill operations, and have been responsible for its remarkable success. Just fifty years ago, one of its mills was designed by an Italian engineer who, too, was a graduate of Columbia School of Mines.

Other mining companies in Idaho such as Day Mines, Sunshine, Hecla, American Smelting and Refining Company, Calera, Triumph, J. R. Simplot, Westvaco, and Monsanto have taken a leading role in the economic development of Idaho and much of the northwest area. The cities of Boise, Hailey, Kellogg, Wallace, Salmon, Lewiston, and even Spokane, to name only a few, were built for and by Idaho mining industry.

As mining developed in Idaho, the number of highly trained mining engineers grew and it was early recognized that a section of the American Institute of Mining and Metallurgical Engineers would be needed. The Columbia Section of AIME, which was formed and now includes all of Idaho as well as eastern Washington and part of Canada, was one of the first three sections organized in the nation.

Idaho started training its own mining engineers at the University in 1890. A separate School of Mines at the University was created 27 years later through the efforts and support of Idaho mining companies and has turned out a steady flow of engineers trained to fulfill the engineering and management requirements for Idaho mines. It has succeeded so well that its graduates are sought throughout the world and has for many years been recognized as one of the top mining schools in the nation.

When registration of engineers started in Idaho some fifty years ago, mining engineers were not required to be registered. As late as 1937 when Idaho law pertaining to registration of engineers was revised, mining engineers were again not required to be registered; but a ruling in 1946 made it possible to obtain a professional engineer's license with especial qualifications in mining engineering. By 1956, a sufficient number of mining engineers had become registered to create legislation to require mining engineers to be licensed. There are now almost a hundred mining engineers licensed by the Idaho State Board of Engineering Examiners of which some 69 reside in Idaho. This represents over one-fifth of the total number of engineers licensed and residing in Idaho in all categories, and is one of the largest groups of registered engineers in the state.

Many of the licensed mining engineers have become members of the Idaho Society of Professional Engineers and it is fully expected that more will join in the future. The need for professional advancement as represented by registration and by ISPE and NSPE is being felt by the mining industry.

Although mining completely dominated Idaho history for the first fifty years, it has taken an equal place with other industries during the last fifty years. In fact, for the last few years, the industry has been on the decline. Increasing imports of cheaply produced metals from foreign countries has cre-

ated a serious market factor for Idaho producers and has caused many of our better mines to close down. The trend will continue until some protection is given to Idaho producers. Although metal mining has been on a downward trend, non-metallic mining has experienced an upward surge for the past fifteen years. For example, there has been a steady growth of phosphate mining, the center of activity being around Montpelier. Other non-metallic products are being produced as our national population explosion demands the various products that Idaho can produce. The future for Idaho mining and its engineers on the non-metallic side looks good.

Engineering Idaho's Irrigation Developments

By H. D. Hafterson, P.E.

Irrigation was begun about the same time that Idaho Territory was established in 1863. Most of the earliest development took place in the Boise Valley on the heels of the mining boom in the Boise Basin in the early 1860's. By 1870, there were almost 10,000 acres irrigated within the state, of which some 6,000 acres were in the Boise River Valley. At the outset, water supply could be provided by relatively short diversions to bottom lands adjacent to the rather steep stream channels. By 1900, almost 600,000 acres had been developed and Irrigation Engineering was off to a running start.

Great strides in irrigation engineering took place during the first quarter of the 20th Century. The Carey Act of 1894 provided additional incentive for irrigation of desert lands and the enactment of the Reclamation Act in 1902 provided Federal assistance in constructing projects. This Federal action gave birth to a new era of irrigation development during which large reservoirs were constructed to supplement the inadequate supply divertible from natural stream flow. Crude diversion structures gave way to permanent diversion dams from which increasingly larger diversions of hundreds and even thousands of second-feet of water could be diverted. Large new areas of desert land were brought under irrigation as canal systems branched out for hundreds of miles through the sagebrush covered plains.

During this quarter century, irrigation was extended to cover over two million acres of desert land in southern Idaho. This was the period of greatest expansion of irrigation in the state. However, during the next quarter of a century to 1950, another quarter million acres were developed and larger storage reservoirs were constructed to supply the ever-increasing demands for water. At the present time, approximately 2,900,000 acres are irrigated in the state.

Most of this development is within the Snake River Basin. In that part of the Basin served by surface water diversions from Snake River and tributaries above Milner Dam there are about 1,374,000 acres so irrigated. Within or adjacent to this area there are 477,000 acres served by pumping ground water. Included within this general area are also those lands served from streams which disappear into the Snake River lavas before reaching the Snake River as do the Big and Little Lost Rivers and the creeks feeding into the Mud Lake area. From Milner Dam downstream to and including the Weiser Basin it is estimated that 742,000 acres are presently being irrigated from surface water of the Snake River and tributaries, and 37,000 acres from ground water. Below Weiser there is little irrigation that is significant in Idaho except in the vicinity of Lewiston where 4,500 acres are irrigated. There are also some 106,500 acres irrigated in the upper reaches of the Salmon River Basin.

In north Idaho, it is estimated that about 15,000 acres are irrigated, mostly in the Rathdrum Prairie portion of the Spokane River Basin near Coeur d'Alene. The Bear River drainage basin in the southeastern part of the state includes some 143,000 acres of irrigated land.

There are 11,145,000 acre-feet of storage on the rivers and streams of Idaho. Of this total, about 7,500,000 acre-feet are in the Snake River Basin above Weiser, and about 6,685,000 acre-feet of this storage is active storage used for irrigation, for flood control, and for power production.

It might well be said that, in spite of this large development of irrigation and irrigation storage, the waters of Idaho are as yet largely undeveloped. In four great rivers crossing the state—the Kootenai, the Pend Oreille, the Spokane and the Snake—an average of almost 69 million acre-feet of water leaves the state annually. On the three northern-most streams, irrigation development will be limited by the relatively small amount of arable land available in this mountainous region. The Snake River, the principal stream having future potential in irrigation development, has an average annual discharge of over 33 million acre-feet at the Clarkston, Washington gauge. A large proportion of this flow, however, is also destined for little development for irrigation inasmuch as two-thirds of the total originates in and flows through the mountainous Clearwater and Salmon River drainages and from the rugged Snake River Canyon area below Weiser.

The historical flow of the Snake River in eastern Idaho, adjusted to reflect present stage of development, averages about 4,405,000 acre-feet as it enters Idaho from Wyoming. The average flow under the same conditions at Weiser, Idaho, where it enters the canyon section between Idaho and Oregon below the broad plain of the Snake is about 11,700,000 acre-feet. Between these two points, there are wide variations in runoff due largely to existing irrigation diversions. The flow of the river in below-normal years is largely stored and diverted above Milner Dam for irrigation uses. Due to this control, no spills would have occurred at Milner through a long dry cycle such as occurred during the several years following the dry 1931. Adjusted average annual spills past Milner Dam averages about 1,130,000 acre-feet and the maximum annual amount is 3,385,000 acre-feet. Below Milner, return flows from irrigation help to swell the outflow from a large number of springs along Snake River which are fed by the enormous ground-water supply under the Snake River Plain. Average runoff of the river at King Hill, below this spring-fed reach of river, is 6,700,000 acre-feet. The inflow from the Bruneau, Owyhee, Boise, Payette, Malheur and Weiser rivers, and lesser tributaries combine with this to make the total average flow at Weiser.

The ground-water resource mentioned above deserves special mention for the part it will doubtless play in future irrigation development. The extensive aquifers in the Snake River basalts and interbedded sediments serve both as a vast storage reservoir and as a ground-water conduit. Transmissibilities are high and the virtually evaporation-free storage capacity is tremendous. The Plain itself is about 250 miles long, 60 to 70 miles wide, and includes some 13,000 square miles. Runoff from tributary valleys which are contiguous to the Plain and from percolating irrigation applications over broad areas of irrigated land furnish recharge to its supply. It provides a reservoir from which millions of acre-feet of water could be withdrawn by pumping as economic conditions permit the extension of pumped irrigation projects.

In northern Idaho, the Rathdrum Prairie aquifer near Coeur d'Alene yields about 1,000 cubic feet per second. Here,

however, the available irrigable land is quite limited.

The irrigable land resources of the Snake River Basin are also vast. It is estimated that there are about 5,800,000 acres of arable land in the Basin, most of which are in southern Idaho. These so-called arable lands are lands, presently unirrigated, which are of sufficient high quality to be considered as irrigable if a feasible means of serving them with water can be found. Some 1,000,000 acres of this total are now dry farmed to the extent that natural precipitation and accumulated soil moisture will support crops. The bulk of the total acreage occurs on the periphery of the Great Snake River Plain above the present limits of irrigation in the north and east, within the broad valleys of Raft River and Goose Creek, on the Bruneau Plateau which extends from the headwaters of the Owyhee River easterly to the Salmon Falls Creek drainage, and on the Mountain Home Plateau south and east of Boise. The soils for the most part are the fine-textured, deep, loessal type with high mineral fertility and excellent water-holding capacity. The abundant production from sustained irrigation of identical lands over half a century leaves little doubt about the high capacity of such soils under irrigation.

From very preliminary and generalized information, it appears that it might eventually be possible to develop somewhat over one million of these arable acres under new lands irrigation and to provide supplemental water to an additional 905,000 acres presently irrigated inadequately. Thus, it is estimated that new projects will affect about two million acres of land in Idaho, almost all of which would be in the Snake River Basin. Depending on the amount of storage and the operating criteria that are finally adopted, over two million acre-feet of ground water would need to be pumped to augment surface water supplies if such development is to be realized. Adequate regulation of surface-water supplies will require the construction of over 7,000,000 acre-feet of storage reservoirs, three-fourths of which would be in Idaho. These storage reservoirs would provide other benefits in addition to irrigation water in form of flood control, recreational use, and power head and storage.

It should be emphasized that this future development is a very generalized estimate of potentials which would require many years and much engineering to accomplish. Many potential projects, some even now viewed as imminent development, will doubtlessly change as refinements are made, but they indicate the very great potential for future development in Idaho. The field of Irrigation Engineering is in its prime.

Transportation – An Early Engineering Field

By E. Dean Tisdale, P.E.

No single factor has played a more significant role in the development of Idaho than transportation. The settlement of Idaho began with the Oregon Trail and gained momentum with the coming of the transcontinental railroads. Later advances in highway and air travel provided a stimulus toward increased agricultural and industrial growth. Engineering contributions during this formulative period were many and varied in each of the three major transport systems, rail, motor and air.

Rail Transportation

The quality of the engineering displayed in locating and constructing the first railroads through Idaho was especially impressive. These early locators used a great deal of initiative in the selection of routes, using only rough contour maps as guides. The high standdards used in constructing the alignment and grades continue to handle today's

rail traffic adequately after nearly eighty years of service.

The primary objective of the first railroads was to reach Oregon with Idaho being regarded as more of an obstacle than as a potential source of revenue ($78 million in 1958). A secondary objective which later developed consisted of freighting supplies into, and ore out of, the early mining camps. Many branch lines were developed to serve the growing number of farm and logging communities. Farm and lumber exports from these communities now provide the greatest source of revenue to the railroads in Idaho.

The Utah and Northern was the first railroad to be constructed in southern Idaho with 206 miles being completed from Cache Valley, Utah to Monida Pass, Montana in 1880. This railroad served as the catalytic agent in the colonization of southern Idaho. The Oregon Short Line bridged the gap from Granger, Wyoming to Huntington, Oregon shortly thereafter with the Utah and Northern becoming an integral part of this line. The Union Pacific later secured a lease on the combine and also absorbed the many branch lines developed by independents to serve the large irrigation projects beginning in 1904. The total rail mileage in southern Idaho is now approximately 1500 miles.

In northern Idaho, three major lines were constructed across the Panhandle. The northernmost is the Great Northern which follows the Kootenai River, passing through Bonners Ferry and Sandpoint enroute to Spokane. The Northern Pacific follows the northern bank of Lake Pend Oreille serving Clarks Fork, Sandpoint and Rathdrum with branch lines from Spokane to Coeur d'Alene and the mines; and from Spokane to Lewiston and the Camas Prairie. The Chicago, Milwaukee, St. Paul and Pacific was the third major railroad to cross northern Idaho and now serves the communities of Avery and St. Maries on the St. Joe River with a branch line to Bovill. Ninety-eight miles of this line were completed in 1905 at a total cost of 11 million dollars.

Major independents in northern Idaho include the Washington, Idaho and Montana from Palouse, Washington to Bovill and the Spokane International from Bonners Ferry to Coeur d'Alene.

Much of the more than 700 miles of railroad construction in northern Idaho was characterized by large trestles, deep rock cuts and steep fills; all of which required many engineering skills under adverse conditions.

In 1957, 268,000 carloads of freight were loaded in Idaho. This represents an average growth of approximately 2.8% per year since 1950, which compares favorably with the national trend in ton-miles of 2.6% annual increase during the period 1949-1956. Railroad passenger traffic declined on a national level during the same period, and although specific figures are not available, it is reasonable to assume that Idaho followed the same general trend.

In evaluating these trends, it appears that railroads in Idaho will continue to sustain a fairly healthy growth in the freight business—especially in farm and lumber products. Development of new lines and facilities appear to be restricted to such local improvements as may be required to serve new industrial, defense or farming developments.

Motor Transportation

Highway development in Idaho began with a westbound one-way operation on the Oregon Trail, followed by stage coach lines, ferries, farm-to-market roads, and finally, an integrated network of highways serving all communities in the State.

Notable engineering achievements in the development of Idaho roads have en-

compassed the construction and maintenance of over 40,000 miles of roads and streets to serve the 348,000 vehicles registered in 1959. This road mileage includes 4,700 miles of State Highways, 27,600 miles of County and Highway District roads, 2,000 miles of City streets, and 8,000 miles of Forest Roads. Some of the more important bridges constructed on the State Highway System in recent years include:

— The mile-long, million dollar, Sandpoint Bridge constructed in 1956.

— The 1300' Blue Creek Bay Bridge constructed in 1953.

— The 600' Caldwell Overhead on US 30 completed in 1956.

— The 370' Malad River Bridge near Hagerman built in 1956.

— The 960' Montgomery and 1300' Heyburn Bridges near Rupert and Burley.

— Presently under construction are Interstate bridges at Ontario, Oregon and north of Declo.

Highway use has far outdistanced the investment in new facilities. In general, Idaho highway travel has been increasing at the rate of approximately 3.5% annually. This is less than the annual national growth of 5.5%, but still represents a substantial increase. No data was available concerning the trend in ton-miles of truck freight hauled in Idaho, but national figures reflect a phenomenal 13.2% increase in the period 1949-1956.

With the trend to larger farm units and subsequent shift of our rural population to urban areas, it is becoming apparent that Idaho's future highway development will be less concerned with the farm-to-market travel which characterized earlier development. It now appears that future highway improvements will be concentrated in three main areas:

1. Arterial highways for community and Interstate use.
2. Urban arterials and city streets.
3. Access roads to new industrial and national defense installations.

Fortunately, Idaho's planned 270 million dollar Interstate development will satisfy the requirements of much of our future inter-community and inter-state travel. Nearly every large community will have convenient access to one of the three Interstate highways which will serve the State.

The urban areas of Idaho however, have many miles of substandard arterials in need of improvement from the standpoint of traffic service, safety and capacity. These needs will become even more critical with the rapid growth which is forecast in the metropolitan areas.

Access roads must also receive an increasing amount of attention with the development of such facilities as the hydro-electric plants on the Snake River, the missile sites near Mountain Home and the Atomic plant between Arco and Idaho Falls.

Air Transportation

Air travel in Idaho was begun 33 years ago by the Varney Airlines, located in Boise with an airfield at the present site of Boise Junior College. This line eventually became a part of United Airlines with service through southern Idaho. This service was greatly expanded in 1946 when Bert Zimmerly started Empire Airlines—later to become West Coast Airlines with direct flights to nearly all major cities in Idaho.

Engineering contributions in the field of air travel have been largely limited to the construction of airports. The num-

ber of ports has increased from 80 in 1945 to 190 in 1959. In addition, several have greatly expanded their facilities.

Air passenger travel, in particular, has shown a tremendous increase in recent years. This is illustrated by an increase from 25,000 passengers served at the Boise Air Terminal approximately ten years ago to the 125,000 anticipated for this year. This represents an annual increase of about 17%. Total number of passengers served by West Coast Airlines in the last ten-year period shows about the same rate of increase as does the overall national trend. Freight handled by air remains a comparatively insignificant percentage of the total handled by railroad and trucks.

A large increase in the value and use of personal planes has also been noted in recent years. Many small planes are maintained by manufacturing, service and distribution companies for the use of business executives.

In conclusion, it appears that here in Idaho much of our future engineering endeavours in transportation will be concentrated in the following fields:

1. Railroad spur development to provide access to new industrial, warehousing, farming, logging and defense developments.
2. The vast Interstate Highway program and associated primary highway connectors to communities.
3. Urban arterial highways.
4. City street development.
5. Access roads to new industrial and defense installations.
6. Expansion of airports together with associated terminal buildings and highway service facilities.

Electrical Power Development

By D. E. Haasch, P.E.

In 50 years, engineering in the electrical power industry has taken giant strides. In 1910, the power industry had just learned to walk, and the customer was just ready to explore the many services electricity could perform for him.

Idaho, a relatively new state 50 years ago, was developing fast with mining, agriculture and lumber, and was quick to grasp the significance of the new tool of power called electricity. The late Irvin E. Rockwell, Bellevue, Idaho, who at one time owned the local electric company at Hailey, wrote that of the first dynamos perfected by Thomas Edison in 1880, one was installed on the steamship Columbia and the other was sent to a smelter at Ketchum. A General Electric scrapbook of history substantiates that the first vessel electrically lighted was the S. S. Columbia in 1880. The scrapbook didn't mention a dynamo being shipped into Idaho, but it is known that an electric system was intalled in the new smelter at Ketchum during that period.

The late Alonzo Price, a nearly lifetime resident of Ketchum whose father worked in the Philadelphia Mining & Smelting Company's plant during its short existence, expressed his opinion that the electric system was installed in 1882.

"I cannot definitely state the date or year that the electric light plant (at the smelter in Ketchum) was put into operation but I do know it was housed in the building that sheltered the first units or furnaces and that it was driven by belt from a line shaft which in turn was driven by a large belt from a master pulley geared to a turbine water wheel. The power of this turbine also turned the

furnace blowers and the crusher and rolls."

Later, Mr. Price wrote, "These records in conjunction with the information contained in my previous letter, some of which were found in a history of Idaho territory, published in 1884, quite definitely fix the date and place of the first hydroelectric plant in Idaho, if not in the entire Northwest, as being not later than August, 1882, Ketchum."

Mr. Rockwell was obviously more interested in the Hailey development: "And so it was that in the 1883-1885 period, with steam from a wood-fired boiler coupled to a small vertical engine, Hailey could boast of the first **public** electric lighting plant in the great Northwest, supported by an income of $5.00 per light per month.

"This little installation became the precedent for building a bigger hydroelectric lamp-lighting plant, of Edison equipment, that began the boundless career of Sidney Z. Mitchell.

Mr. Rockwell wrote that "Hailey boasted of the first electric lighting plant," but he made this concession, "Admittedly, the inspiration for the project stemmed from the nearby Ketchum smelter fixed in place two years before."

Mr. Rockwell says the (hydroelectric) system in the Ketchum smelter had 25 lights; the steam plant at Hailey, 100 lights. Then came the hydro plant at Hailey with 250 lights.

"With easy money skimmed from the nearby bonanza mines, reaching the peak of prosperity, Edison's largest single unit generator with complete auxiliary equipment, including a specially designed water wheel, was purchased at a cost of $20,000. This was the historic first hydroelectric lighting plant in all the area comprising the six northwestern states. It could serve 250 carbon filament lamps. Any other electric gadgets were unknown. Lighting was the thing. Christmas Eve, 1885, found the city aglow with adequate and never-to-be-forgotten ceremonies attending."

Boise harnessed the flow of a canal to generate power, and completion of the project was celebrated July 4, 1887. Three years later, a small 20-kilowatt steam plant was placed in operation in the railroad yards at Pocatello, and in the next 16 years, power plants became about as numerous as the communities of the valley. In fact, some 50 operating enterprises or companies were conceived in those early days. They soon boiled down to 19, and in succeeding years, the 19 became five companies.

Even the five companies, the immediate predecessors of Idaho Power, found financial problems overwhelming. Three of these were in receivership when the final consolidation and birth of Idaho Power was accomplished in 1916.

The original electric service rate placed a flat charge of $5.00 per light per month. Later, it was changed to 20 cents per Kwh. This can be contrasted with an average cost of 1.65 cents per kilowatt hour for household use. Also in 1910 or 50 years ago, the peak load was less than 10,000 Kw. The 1959 yearly peak was 580,000 Kw.

Engineers of the past whose contributions to the electrical development of Snake River Valley stand lastingly as monuments to their planning, include W. T. Trenner, a chief engineer of one of the predecessor companies and the early years of the Idaho Power Co.; A. J. Wiley, who designed some of the early-day power plants along the Snake River; E. A. Woodhead, originally of the Great Shoshone Light and Water Co., who helped or supervised the building or renovation of every generating plant of the Idaho Power Co. until his death in 1957. He was a 50-year veteran in developing electrical power out of the Snake River

Valley gathering, in the process, nation-wide recognition.

Two men who can spin tales of happenings of 50 years ago are Cal Crane, an electrical engineer, who designed and built the transmission lines and substations down through the years, and Hank Senger, originally of the Idaho-Oregon Light and Power Co., who worked at the Oxbow site and became chief engineer of IPCo in later years.

Just as Idaho was among the first in the Northwest with its power installations, Idaho also furnished the engineers to build the largest of river dams. Frank Crow, of Arrowrock Dam construction, was in charge of Hoover Dam. Frank Banks proved his ability on Idaho problems and applied them to the mighty Grand Coulee Dam.

Hand in hand with the engineers, someone had to be the builder. Harry W. Morrison started 48 years ago as a two-man team partnership with horses and Fresno scrapers. The Morrison-Knudsen, Inc., prestige is now international in scope.

The early day engineering approach is interesting. Mr. Woodhead once said, "In the early days, we took a look at the ground surface of the power site and decided without further investigation that it was or was not suitable. Construction could start almost immediately on a site judged suitable.

Today, power sites are now analyzed by geologists and soil experts as well as engineers. Considerable money is wisely spent in thorough exploration of proposed sites. Extensive angular and vertical drilling is done to determine the nature of the substratum. The site is located with extreme care. An additional foot of water in the reservoir at the Bliss plant is equivalent to another thousand kilowatts.

Today, in 1960, the Oxbow power plant is under construction in the Hells Canyon area. This plant will have a name-plate rating of 190,000 Kw. The plant is being constructed on the old Oxbow hydro site that was under construction 50 years ago. The older plant, only partly developed by the Idaho-Oregon Light & Power Co., was abandoned in about 25 years because it was uneconomical. Actually, it was constructed on too large a scale for the times. It was designed to develop 15,000 Kw. or about twice the entire Snake River Valley requirements.

The construction of the new plant at the Oxbow site is over ten times as large and marks the advance of engineering "know-how" in the last 50 years. It is interesting to note that the same scheme of development of the river site is being used today.

The Oxbow plant development closely follows the completion of the Brownlee plant which was put on the line early in 1958, with the installed capacity of 360,000 Kw. The earth-filled dam impounding the water of the Snake River, creating a lake fifty-seven and one-half miles in length, was the second highest of its type in the world at the time of its completion.

The power requirements of the home, farm, and industry, and the increased electrical use from day to day requires the construction of this second power development immediately after completion of Brownlee.

The forward march of engineering "know-how" in the past 50 years has produced the completion of the dreams of 1910. The next 50 years will require engineers of the same caliber with as great a foresight and daring to lead the way for maximum development of electric power in Idaho.

Engineering Keeps Idaho Lumber Industry Competitive

By Bill M. Chronic, P.E.

Engineering, within the Idaho Lumber Industry was basically non-existent in 1910. Logging techniques consisted of clear-cutting the readily accessible timber, with waste prevalent. The logs were transported to the mill by horse drawn wagon, sleigh and rail. At the mill, the basic lumber cuts were made with slabs, edgings, sawdust and shavings going to the wood burning furnaces and the burner. Miscut orders were hauled to the bone yard and burned. This trend was universal, as commercial harvest of our forests moved westward across the Nation.

As the readily accessible timber was depleted, the operators saw the need for scientific methods to conquer the constantly increasing log hauling problems. New methods took on many forms, such as: the greased chute, flumes, river drives, rail, trucks and tractors. One firm near Avery, Idaho, utilized two parallel rail lines up the face of a mountain. Empty cars were pulled up the incline by cables attached to the loaded cars as they descended. Today, diesel trucks up to the 300 H.P. class dominate the field.

The industry later realized its existence was dependent on sustained yield of the forests and maximum utilization of its products. Prudent operators today are staffing their plants with Chemical Engineers for wood utilization research and Mechanical Engineers for plant modernization and "by-product" machinery.

Presently, most of the merchantable timber comes from U. S. Forest Service sales, governed by a balanced program of sustained yield, which encompasses utilization and conservation without waste. Civil Engineers integrate economic log hauling studies with watershed conservation in providing location, design and plans for access roads. These roads accommodate the log handling behemoths of today.

Firms of Idaho which are keeping abreast of the times include: McGregor-Triangle of Boise for their log-hauling technique, Potlatch Forests of Lewiston for their pulp mill, and Pack River Lumber Company of Sandpoint for their "Tenex" pressed-board plant.

The theme is "Scraps to Riches" with the status of this great natural resource, 50 years hence, reflecting todays wisdom. The stakes are large, the challenge is ours, and the guaranteed success belongs to the public.

Atomic Energy In Idaho – Engineering Stronghold

By Public and Technical Information Division — AEC

Perhaps the largest single employer of engineers in the State of Idaho, or surrounding states, is the atomic energy industry now in its tenth year.

Centered in the Atomic Energy Commission's National Reactor Testing Station, the nuclear testing and development activities in Southeastern Idaho are known as the Nation's fastest-growing atomic energy complex. It was established in mid-1949 for the building and test-operation of nuclear reactors, allied plants and equipment. The NRTS, as it is familiarly known, has been called "The desert site where reactors are tested wholesale", although originally not more than 10 reactors were contemplated for construction by 1964.

Expectations have been exceeded to the extent that 24 reactors have been brought to criticality (steady operation) during the 10 years since inception, and 20 are still operating or operable.

A British journal has epitomized these 10 years of progress as follows: "The biggest and most varied collection of atomic reactors in the world stands on

a vast, bare plateau in the American State of Idaho."

The pace continues. Four more reactors, including one of the largest of them all—the $29 million EBR-II (Experimental Breeder Reactor No. 2)—are in various stages of construction. Another four are ready or being readied for construction.

In addition to reactors, five other-than-reactor facilities, including the $50 million Chemical Processing Plant, are in operation, and two major non-reactor facilities are under construction—the $6 million Waste Calcination Facility and the Army Administration and Hot Cell Area.

A permanent force of 4,500 is required to operate the $300 million complex which is the NRTS, and more than 600 of these are engineers. The nature of NRTS operations requires men trained in all fields of the engineering profession. The Atomic Energy Commission and its contractors in Idaho employ chemical engineers, civil engineers, electrical engineers, mechanical engineers, metallurgical engineers, sanitary engineers, nuclear or reactor engineers, and others engaged in the design, construction, maintenance, and operation of the many facilities as well as research and development work in support of the various programs.

In addition to engineers proper, the NRTS work force includes more than 200 chemists and physicists whose work and training involve considerable engineering. Also, more than 100 NRTS employees classified as technicians have BS degrees in engineering, and quite a number of top administrative people have engineering degrees.

Aside from operating a chemical separations plant and various types of reactors and related facilities, the NRTS also carries on a wide variety of businesses and services such as are found in the average community. These include: steam plants, heavy and light equipment pools, warehouses, a railroad line, a laundry, cafeterias, lead shop, photo laboratories, bus depot, medical clinics, garages, gas stations, machine shop, libraries, a shoe store, a printing plant, a U. S. weather bureau, a concrete batching plant, a blueprint and drafting service, power, water, sewage and communications systems, road maintenance, plant and fire protection, a 100-unit fleet of large passenger busses and craft shops.

The Idaho Operations Office, which is the AEC's administrative arm in Idaho, not only has responsibilities for operating the NRTS, but directs a building program that has accounted for most of the large plant investment at the site. This not only includes engineering and construction in support of Idaho Operations Office facilities but a substantial part of similar support for the program of other AEC operations offices which have facilities at the NRTS. This program averaged 38 contracts for 112 projects costing $15 million annually from 1950 through 1955 and increased steadily to a 1958 program that consisted of 80 contracts for 264 projects totaling $24.8 million. The AEC's Idaho Operations Office Division for Engineering and Construction as of December 1959 employed 35 engineers to administer this program.

Besides the 600 permanent-force engineers, a substantial number of engineers have comprised part of the seasonal or temporary work force employed by construction contractors since 1950 to carry out the AEC's multimillion dollar building program at the NRTS. This seasonal employment, including engineers, has averaged about 860 annually for the past 10 years. A much larger number of Engineers, many hundreds in fact, have been employed and continue to be employed to perform the architect-engineering work that determines what is actually built. Many of these perform their work at points far removed from the site. Still other engineers engaged in NRTS work, both on and off the site, are employed by several engineering firms retained by the Idaho Operations Office

on a more or less continuing basis to perform special design and inspection work involving urgency and familiarity with conditions.

The annual payroll of the Commission and its major operating contractors in Idaho has grown to a figure approaching $30 million. This is exclusive of several million dollars in wages paid annually for construction workers. In addition, another several million dollars are spent yearly to purchase materials and supplies for operation of the Station. The economic benefits of these expenditures are felt throughout Idaho and adjoining states.

The steady upward curve of employment opportunities in atomic energy has enabled young people, particularly college graduates, to mature into highly skilled lines of work and yet remain in their home state or area, thus alleviating a situation that had forced many to seek careers elsewhere.

In this connection, more than half of the 4,500 permanent employees working for atomic energy in Idaho are Idahoans by previous work or residence. It is also a cosmopolitan work force, incorporating an influx of new citizens from all parts of the world who have provided cultural and social stimulus to the area. Every state of the Union, including Alaska and Hawaii, as well as seven foreign nations (England, Canada, China, Poland, Scotland, and Wales) are represented on the NRTS employment rolls.

Since no one lives at the site, the Station's workers reside in some 30 adjacent communities, although the majority (nearly 70 per cent) live in Idaho Falls where the AEC maintains its Idaho Operations Office and NRTS headquarters.

The rapid expansion of operating facilities at the NRTS has necessitated a 141,000-acre addition to the original 431,000 acres of largely public domain land that was set aside for the Commission's use commencing in 1949. By enlarging the physical size of the Station from 673 to 894 square miles—about three-fourths the size of Rhode Island—the chances that airborne radiation from site operations will get beyond the Station boundaries are minimized. Environmental safety is one of the Commission's foremost considerations.

The suspension of weapons testing has had little curtailing effect on the NRTS where the main emphasis is on developing the atom for civilian purposes, although the Station is widely known for prototyping the first nuclear submarine and for its aircraft nuclear propulsion testing program. Even a primarily military reactor concept like the pressurized water reactor for the submarine Nautilus has been generating electricity in the Pittsburgh area for more than a year. Eventually, there is a similar prospect for the series of reactors being developed in the rapidly growing Army Reactors Experimental Area at NRTS, which has transportability of small, compact reactors to remote and inaccessible areas as a future goal. The potential value of such reactors for civilian use is obvious.

The Station has played an important role in pioneering (1) the testing of materials in high flux reactors, (2) the Commission's principal research program in the kinetics of reactor safety, and (3) development of four major power reactor programs (pressurized water, fast breeder, boiling water, and organic moderated.)

History has been made at NRTS. Practically every reactor built or being built owes some kind of debt to the MTR (Materials Testing Reactor), one of the first major installations to be constucted at the NRTS. The first NRTS reactor, the EBR-I (Experimental Breeder Reactor No. 1) made history when it first proved the breeding principal and in 1951 produced man's first usable electricity from nuclear heat. Borax-III in 1955 became the first reactor to power and light an American community. The community was Arco, Idaho.

In a New York Times interview, Prof. Vasily S. Emelyanov, head of Soviet Russia's main administration for the peaceful utilization of atomic energy, expressed amazement at the number of different research reactors being built or in operation at the Idaho testing station—"so many that we couldn't see them in one day. It is a college for all people who will design and build reactors in the future."

This "college" is attracting increasing numbers of authorized visitors from the United States and all parts of the world. More than 27,000 having a special need to know for official business visited the Station in 1958, and that number was surpassed well before the end of 1959. Many of these were foreign visitors from more than 35 different nations.

Professor Emelyanov's statement points up the fact that the Station's original role as purely a testing station has been considerably augmented by research and development work, particularly in the fields of (1) reactor safety studies, (2) new methods for the chemical processing of reactor spent fuel elements, and management of resultant radioactive waste products, (3) basic reactor physics investigations, (4) improved instrumentation and techniques for the radiation protection of personnel, and (5) measurement of nuclear reactivity changes in irradiated materials for the purpose of improving the components of future reactor construction.

Meantime, there is no immediate change, as far as can be realistically projected, in the continued pattern of growth at the NRTS. Besides the new reactor facilities under construction or design, new reactor developmental concepts are in the offing for possible assignment to the Station. It would appear that the Station will continue to play a leading role in the Nation's atoms for peace program and in the area's economy for some time to come.

Future Engineering Developments

By R. P. Jones, P.E.

Reclamation

Idaho's growth is closely tied with reclamation. The following projects are anticipated in the near future: (1) Garden Valley—A combined power and reclamation project which consists of a diversion dam on the North Fork Payette River and a high dam and re-regulating dam on the South Fork of the Payette River. The power revenues will offset the cost of reclaiming the land in the lower Payette River valley. (2) Mountain Home—A combined pumping, power and storage project involving the Guffey site on the Snake River, Lucky Peak dam on the Boise River and Canyon Creek near Mountain Home. There will be approximately 132,000 acres of new land brought into cultivation by this project. The new land will be in three parcels, the Hillcrest Section, Dry Lake and southwest of Mountain Home. In the immediate future, pumping from Idaho's vast underground storage in the plains surrounding the Snake River hold the most promise for new irrigable lands.

Power

The completion of dams at Oxbow and Hells Canyon by Idaho Power will be a reality within the next decade. New sources of hydroelectric power will have to be developed to keep abreast of Idaho's growth. The Salmon River and its tributaries offer possibilities for hydro development hitherto untapped. Perhaps nuclear energy will be used for power as more efficient and less costly means of harnessing the atom are developed.

Agricultural

Increasing diversification of crops will lead to new agricultural processing plants and methods.

Transportation

The Interstate Highway System should be completed by 1975. Highway traffic will double by then on the highways of

Idaho. Safety devices will improve and highway accidents should be reduced by ⅔ by the Interstate System. Automation for highway users now in the experimental stages may be commonplace in the not too distant future. Vehicles are guided electronically by signals picked up from a magnetic tape. Another peek into the future shows an induction-type radio transmitter already in the experimental stages which operates from a wire imbedded in the road. This unit can pick out road hazards ahead of the vehicle and forewarn the traveler.

Slack water navigation down the Snake to Columbia Rivers to Pacific Ocean may be a reality by 1970. Construction of four more dams—one of which is now authorized—between Lewiston and Bonneville will complete planned control of Lower Snake and Columbia.

Mining

The most significant development will be the shift from metals to non-metal mining. The production and utilization of phosphates and their derivatives for fertilizer and chemical industries will increase.

The development of clays for ceramics and a breakthrough into alumina production is expected.

Lumbering

Lumbering production will increase substantially and Idaho's portion of western lumber production should increase from 17 to 20 per cent of the total western output. New industries to use forest products will be developed such as pulp mills and plywood mills.

Atomic Energy Commission

The National Reactor Testing Station will continue to expand with atomic research as the prime factor in its growth.

Missiles

The federal government has earmarked $45,000,000 to spend on an inter-continental ballistic missile program at Mountain Home. This program may stimulate other investments in missile development and allied industries.

The Future Of ISPE

By Clifford C. Hallvik, P.E.

National Director For NSPE From State of Idaho

The past portends the future. The Idaho Society of Professional Engineers has an enviable record of a half century of solid growth with commensurate gains in respect and prestige. Of this, the citizens and engineers of Idaho can be rightfully proud.

As we celebrate this Golden Anniversary of ISPE, we find ourselves in an era of rapidly developing and great scientific achievements. Let us hope and believe these developments will be recorded in history as progress. In any event, the influence of the Engineer in the every day affairs of the state and nation is becoming ever greater.

Let us project ourselves to ISPE's Diamond Anniversary in 1970 and look back. From this synthetic position or vantage point, the immediate past of ISPE is but recent history.

In the last 10 years, we have doubled the number of our active members, it is now approximately 800; in 1960, there were only 400. It has been a vigorous group of Engineers bent on grasping every opportunity to enhance their professional position in the day to day community life and in the economy of the nation.

Breaking into the educational field was a challenge. ISPE has now become closely associated with the major institutions of higher learning in Idaho. A student chapter of NSPE is fairly well-established at the University of Idaho and the sections of ISPE have successfully sponsored student chapters at the Junior Colleges and Idaho State. This all came about several years ago.

The problems in regard to unionization vs. professionalism, which was a matter of much concern to our contemporaries in the more industrially developed states

during the period 1940-1960, has now come to be a challenge to ISPE. If we are to maintain our professional stature, the Engineers must defend their individual nature and stay clear of the labor organizer's honey talk. We have successfully warded off these efforts but the fight is not over.

Do you remember the controversial issue during the period of our Golden Anniversary in regard to corporate practice? After lengthy consideration and healthy debate in a considered atmosphere, this problem was resolved. Perhaps this problem was not resolved to the satisfaction of everyone, but there was compromise in a manner that permitted operations under a business structure in keeping with the times. It was a challenging and interesting situation that provoked much professional thought. The controversial approaches to the resolution of this legal situation stimulated greatly the closer banding together of Engineers to defend our position on this matter.

Some of you will remember the Armco Scholarship Program that NSPE undertook about the time of our Golden celebrations. It is a chore for Idaho Chapters to sift out candidates. How fortunate ISPE was to produce a winning candidate on the initial scholarship offer. Now we are charged with selecting candidates for several scholarships. The chore is no greater and this program has done much to foster better public relations and regard for the Professional Engineer.

Don't you remember, too, the hours of discussion and pages of printed matter that came forth in the attempts to form a national unity organization to represent all of the Engineers? ECPD, EJC, the Functional Plan—they all bring back memories of long and inconclusive discussion. You recall how NSPE held its position and claimed that it could best be spokesman for the Professional Engineer in matters of professionalism, ethics and promotion of legislation affecting the Engineer. The maintenance of this position and the requirement that membership to NSPE is available to only those having professional status by legal registration eventually has resolved the situation where NSPE, of which ISPE is a member chapter, is emerging as the organization that will speak for all branches of engineering in the areas of professional, ethical and legislative activity. The founder societies are accepting the technical area and are gearing their programs to concentrate in that area only. The recent announcement that 75 percent of the individuals composing the membership of NSPE, now 100,000 plus strong, belong to one of the founder societies and vice versa is no great surprise in this year 1970.

The ladies auxiliary was having some of the usual organizational difficulties to get under way at the time of our Golden Anniversary. The Southwest section was quite active but the others appeared to have trouble getting off the ground. Now, as we approach the 60th year of ISPE, we find a strong auxiliary group. The social events fostered by the ladies and the projects they have undertaken have had much to do with making the Engineer known and respected in the community.

Space does not permit continuing discussion of the many activities ISPE has dealt with since the Golden Anniversary. We could mention the young Engineers, EIT program, the increased activity of functional groups and many others.

The past portends the future. ISPE is on solid footing with much potential leadership in its young members. ISPE will move forward to greater achievement and recognition. Come, men, let's make it real.