

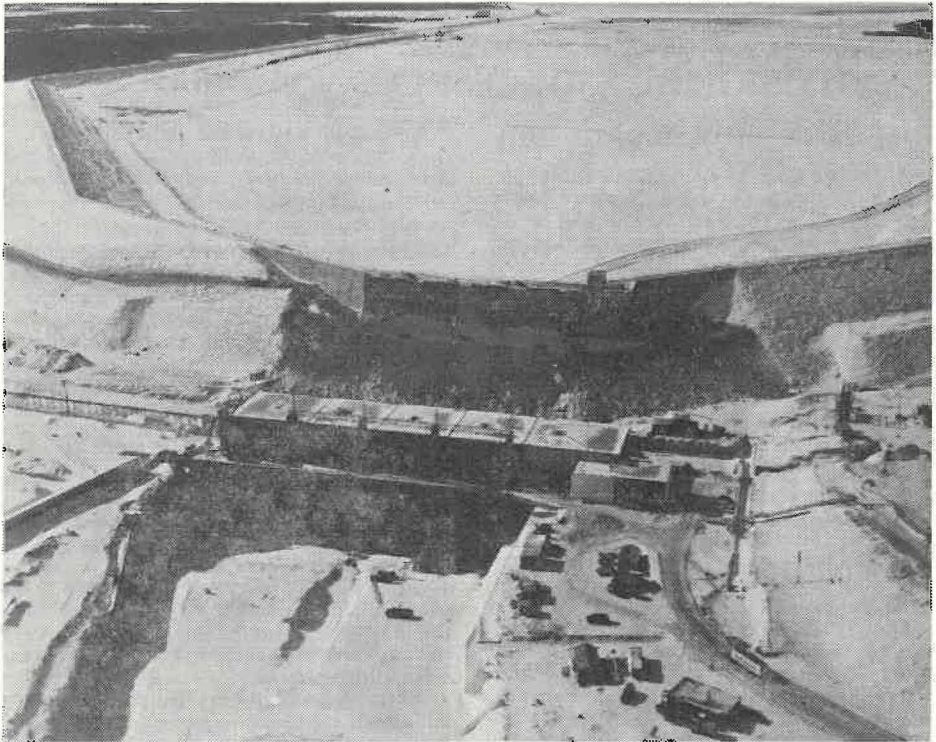


THE MANITOBA PROFESSIONAL ENGINEER

July, 1964

Bulletin of the Association of Professional Engineers of the
Province of Manitoba

GRAND RAPIDS GENERATING STATION (See Page 7)



An aerial view of the powerhouse area in March, 1964. The tailrace channel excavation is in the foreground. Dyke No. 1 South on the left and No. 1 North on the right abut the intake structure concrete wing walls. Forest cover has been cleared from the immediate forebay area.

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President's Message By B. CHAPPELL, P. Eng.

OUR NEEDS TODAY

In the last issue of the Bulletin a brief review in retrospect was taken in regard to the aims, growth, and general development of the Association. Within the organization, and not always readily apparent to the membership as a whole, there is a varied and active business to attend by your Council, committees, and individuals. The multitude of detail flows smoothly through the office, thanks to the capabilities of the Executive Secretary, and the co-ordinating efforts of the Registrar.

The first six months in office have clearly demonstrated to me the broad and potential scope of the work that is required to fulfill the obligations and demands of normal routine. It has been my honor and privilege to attend and represent the Association at such well attended annual meetings of the Manitoba Land Surveyors; Manitoba Architects Association; Ontario Association of Professional Engineers, at Niagara Falls; Alberta Association of Professional Engineers at Edmonton; University Graduating Engineers' final function; Electric Service League at Winnipeg; and observer at the Annual meeting of Canadian Council at Regina. Your Vice-President attended the Saskatchewan Association of Professional Engineers annual meeting at Regina.

I would like to have dwelled more at this time on some aspects and subject matter discussed at, and common to nearly all these meetings, but this will be left to a later issue. Eminently stressed, however, at most sessions was the need for the furtherance and continuation of education in all Engineering groups; to maintain the pace set by technological pro-

gress, and to achieve the eminence expected of the Engineer. Panel discussions were prominent in the programs, were well developed, and sustained a high interest among the well attended sessions.

But, with all this, each Association was continually and visibly aware of the problems and demands of its members. From the 22,000 member Ontario Association to the few hundred member Associations, there was evidence of the awareness to expand in scope of work and related staff to affect efficient service and better understanding between Engineers in the professional, social, and political atmospheres.

Budgets of most associations dictate restrictive measures to achieve what many of us would like to foster; growth is usually conservative and services maintained at minimums. In Manitoba, we have many Engineers whose contact with the majority of membership is infrequently, if ever made. Plans are being made within the organization to extend this field and to develop a communication which will bring all closer together.

At the present time we are currently being faced with a decision in the appointment of a new Registrar to replace Oscar Marantz, who resigned early in May because of leaving the City; a decision, not so much in the appointment, but whether it be part time or full time; to meet generally our immediate commitments or to cope with expanded activities or contemplated developments.

Our present membership — about 1300 — with the current annual fee of \$15.00 has obviously a modest budget to meet normal expenses; and consideration of addition to

permanent full time Registrar must be carefully weighed in relation to functions and duties to be performed in the best interests of the membership. Fee increases, even modest as they are in a Professional group, are to be avoided until such time as the size and needs provide tangible evidence of benefits commensurate with the increase.

Furthermore, too, is the matter of adequate office and conference space. Committee members particularly are well aware of the restricted office facilities and we are presently reviewing proposals to enlarge or acquire more suitable quarters.

These, briefly, are some pertinent items under consideration of Council.



COUNCIL MEETING

April 1, 1964

Present at this meeting were: President Chappell, Registrar Marantz, Councillors Rettie, Sommerville, Weber, Hoogstraten and Russell.

The accounts for the first three months of 1964 were presented to Council and accepted.

Council approved the granting of nine licences, accepted two transfers and approved five registrations. Four applications for registration were received and Council directed that three of the applications be sent to the Board of Examiners, while it decided that one applicant should have more experience before further consideration could be given to his case.

It was decided that the Roster be brought out again this Fall, thus keeping the issuance of the Roster on a two-year basis. The question of advertising in the Roster was to be referred to the Membership Committee for that Committee's report.

The minutes of the Board of Examiners were presented to Council and duly accepted subject to a minor correction.

The Engineers-Architects Committee report was presented in draft form and approved by Council.

Council heard an interim report on the annual assessment being charged against the Association by the Canadian Council of Professional Engineers. It was brought out that the assessment has been steadily increasing over the past few years and Council are naturally very interested. While broad details of the build-up of the assessment were given by the C.C.P.E., Council has yet to receive more detailed information, which it was hoped would be forthcoming shortly.

A letter from the Winnipeg Branch of the E.I.C. was read which requested the assistance of the Association in setting up a series of Development Courses to be held in Winnipeg in September. It was decided by Council that, while the Association would be prepared to assist in publicity and mailing, the President would meet with the E.I.C. Chairman to explore further means of assistance of a non-technical nature, since the Association does not exist for the primary purpose of the dissemination of engineering knowledge.

A letter to the Association from the Association of Consulting Engineers of Canada was read to Council which proposed that an Engineering pavilion be erected at the World's Fair at a cost of \$1½ million and that the Association be invited to contribute to the cost. After some discussion Council decided to inform the A.C.E.C. that Council felt that body should contact the Canadian Council of Professional Engineers, which would no doubt give guidance to the various Provincial associations.—T.G.H. McK.



COUNCIL MEETING

Present at the Council meeting of June 10, 1964, were President Chappell, Vice-President Borgford and Councillors Rettie, Sommerville, Harland and Finnboogason.

Council then approved the enrollment of ten Engineers in Training, three Transfers, one Reinstatement and thirty-one Registrations. Three registrations were rejected due to insufficient engineering experience on the part of the applicants and one registration was held pending further information.

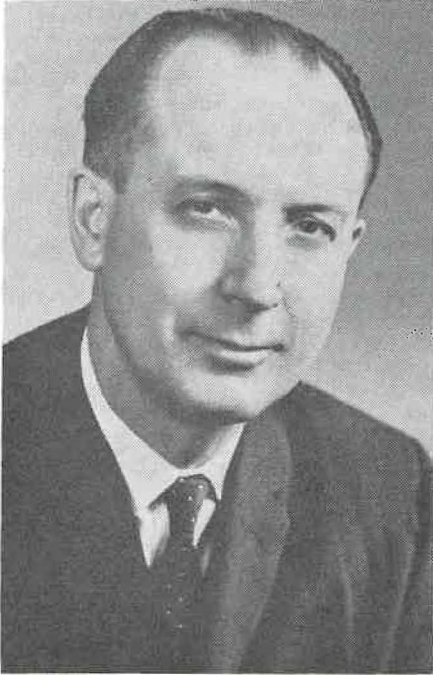
Mr. T. E. Weber was reappointed as Registrar to September 30th.

A discussion took place concerning the appointment of a full-time Registrar. It was agreed that Council should take the necessary steps toward securing the services of a full-time Registrar.—R.M.S.



ENGINEERS IN TRAINING

The following have been enrolled as Engineers in Training: J. K. Holland, J. T. Christison, G. W. Cruickshank, J. E. Forrest, A. Gretzinger, D. W. Miller, R. G. Miller, W. B. Schumacher, G. L. W. Webb, J. B. Corkal, R. J. McPhail.



H. F. Zurbrigg, P. Eng., Chief Geologist for The International Nickel Company of Canada, Limited and Vice-President, Canadian Nickel Company Limited, has been awarded the Barlow Memorial Medal for the year 1963 by the Canadian Institute of Mining and Metallurgy for his paper: "Thompson Mine Geology".



ENGINEERS PREFER GOLF TO WORK

PEACOCK WINS AWARD

Friday, June 12th, the day of the Spring Golf Tournament at St. Boniface, was cool, wet and windy. It rained most of the morning and blew and rained part of the afternoon. Confronted with the choice of golfing in a squall or working, 101 engineers chose to golf and 5 decided to stay inside where it was warm and dry, and work. The five unusual, minority types, were Bill Adams, George Durnin, Gordon Denson, Bob McKibbin and Bill Alexander.

The event started shortly after 11 a.m. with Lloyd McGinnis sprinting for the first tee. We were sorry that Bill Isberg and John Lewis were unable to attend, but Ross Adamson did his best to live up to the standards set by these two ardent golfers — counting the 27 Ross

got on the 17th, he tallied up a score of 162. George Schotch won the prize for the hidden hole, with a 3 on the second (Ed Hudson got a 10 on the same hole). Messrs. Hanson and Lynn won prizes for birdies and the rumours that Bill Lynn won because he bribed the chairman of the Sports Committee are completely unfounded.

A few of those to break 100 included Don Miller, Walter Brock, Siggi Goodbrandson, Larry Hurwitz, Gordon Marshall and Harold Wilson.

Jack Tarnava's companions decided the only way to beat him was to send him out on the course in a weakened condition, so they refused to let him finish his luncheon omelette and hustled him off to the first tee. Boris Hryhorczuk waited an hour at the first tee for his friends, but when he found they had decided to play the course backwards, starting with the 19th hole, he changed partners and joined Art Carlson and Bill Beley who established a new course record, carding the largest number of strokes in the shortest period of time and coming off the 18th well ahead of several who had started long before they did on the first tee.

John Dennis still has all the attributes of a champion and talks a great game. Jack Peacock won a new award, established in his honor, as the most consistent complainer.

When Art Sparling, Jim Warrener, Larry Kay and George Balacko had failed to return to the clubhouse with their scores by 9:30, loaded St. Bernards were sent in search of them. One unconfirmed report says that the dogs returned unloaded but the foursome may be still in the bush hunting for lost balls. Volunteers are asked to join in a search next weekend.

Bob Junker and Jeff Caverly represented the mining contingent and played a two ball two-some, with a total score of 228.

Bob Byers, Chairman of the Sports Committee, proved to be a real sport. He didn't win any prizes himself, didn't give any to his boss and was over in his cash.

Considering the weather and that no jokes were told at dinner (Jim Scotten wasn't there) it was a most successful tournament.—S.J.A.



COMMITTEE VOLUNTEERS

Some months ago the Association sent out a questionnaire to determine how many members would be interested in serving on Committees. The response was so overwhelming that it has not been possible to appoint all those who volunteered to Committees at this

time. A file will be kept of those who have expressed a willingness to serve and it is hoped that anyone wishing to do Committee work will be given the opportunity at some future date. Meanwhile, we wish to express our appreciation to all those members who offered their services.



FOREIGN CORRESPONDENCE

Charlie Pike has written from his outpost at Schreiber and reports the Pikes are all in good health and are not finding the social activities at Schreiber too exhausting. The Social Committee has no plans to discontinue sending Charlie collect telegrams reporting on their activities and to let him know he is missed in their midst.

Chris Gillespie has written from Boston to express his outrage over the removal of his name from the masthead of this fine journal, "Doubtless on the flimsy excuse that I haven't sent any articles. All I can say is such a thing would never have happened in my day as editor. We kept several silent partners (one might almost say comatose) on the Board for years." (Ed. Note: Comatose means "in a coma, lethargic." We know, we looked it up. Chris is living in Boston with the Bride Santa Claus brought him last Christmas. He is working,

sailing, driving in the Boston fog and saving his pennies for a jet. So far he owns the seat covers in the cockpit.



NEW MEMBERS

The following new members have been registered: R. M. Girling, I. Spector, A. W. Allman, A. U. Gulbey, D. G. McIntosh, K. E. Nixon, G. E. Padbury, M. G. Williams, G. G. Duncan, R. W. R. Haag, J. C. Howarth, S. J. Kustra, T. E. Morimoto, R. D. Fairley, D. H. Bishop, J. I. Bogdonov, M. D. McKall, R. R. McKibbin, M. A. Mayer, T. E. Patteson, B. W. Purdy, R. Seepish, S. J. Staseson, D. J. Struthers, R. H. R. Tide, A. A. Burstein, R. K. Kaminski, J. C. Newby, K. R. Ouelette, M. J. Schjerning, G. A. Smith, S. P. Wake, F. J. Clancy, G. F. McAulay, J. M. McNeil, T. Shkordoff, G. T. Black, N. R. Blaine, N. R. Croome, N. P. Feschuk, K. L. Foster, G. V. Giddins, A. D. Gould, D. Hedervary-Konth, C. H. Howard, M. J. Karamihias, J. H. Kennedy, P. Kowalyk, C. Krahn, E. Loewinsohn, H. A. McKenzie, K. W. McLellan, F. A. Macatavish, J. K. Mann, M. T. Moriarity, D. J. Murphy, R. A. Nobbs, G. W. Reed, B. R. Renwick, D. J. Scott, P. S. Skarsgard, V. J. Steciuk, T. H. Weeks, G. J. Wiebe, H. Haak, Wm. McKim.

Technical Development Program

WESTERN CANADA AND NORTHERN ONTARIO REGIONS I, II AND III ENGINEERING INSTITUTE OF CANADA

Depending on the requirements as determined by answers to questionnaire, graduate engineers' up-dating courses will be given from the following selections:

- | | |
|---|---|
| * Plastic and Ultimate Design | * Mechanical Vibrations |
| * Digital and Analogue Computers | * Business Administration (one of) |
| * Project Planning and Control,
Using Critical Path Method | ** Applied Statistics as Related to Quality Control |
| * Frame Analysis | ** Management Planning and Control |
| * Soil Mechanics | ** Human Relation and Management |
| * Introduction to Transistor Circuitry | ** Marketing — including |
| * Heating and Ventilation | The Role of Promotion |
| * Industrial Electronics, Power Rectifiers | Channels of Distribution |
| * High Voltage Insulation and Testing;
EHV Transmission Concepts | Pricing and |
| | Date-setting |

For additional information; Write:

DATES: September 1, 2 and 3, 1964

THE DEPARTMENT OF UNIVERSITY EXTENSION
AND ADULT EDUCATION
The University of Manitoba

PLACE: The University of Manitoba
Engineering Building

Jointly sponsored by Winnipeg Branch E.I.C., A.P.E.M.
and

COST (estimated):

Registration Fee — \$25.00

The University of Manitoba

In Memoriam



DOUGLAS L. McLEAN, P. Eng.

This Association lost one of its most distinguished members with the passing on April 21, 1964, of Douglas Lauchlin McLean, aged 78 years.

Mr. McLean always took an active interest in the Association and served as Councillor from 1925 through 1928 and was President in 1926.

Born in Ottawa, Ontario, he graduated in 1909 from McGill University in Civil Engineering, with honors in Electrical Engineering, leading his class and winning the British Association Medal and prize. His early engineering career was in hydraulic and power development as well as municipal water and sewage works in Ontario, Quebec, New Brunswick and New York State under J. B. McRae, Consulting Engineers, Ottawa.

This was followed by work with the Manitoba Hydrometric Survey, investigating the power possibilities of this Province and with the International Joint Commission surveying the south Saskatchewan River water supply near Elbow and securing data on the Lake of the Woods watershed.

In 1913, he joined the staff of the Greater Winnipeg Water District as special Assistant to the Chief Engineer on the Shoal Lake Aqueduct location survey. He was particularly

proud of the work performed under his direction at the upper end of the project which indicated that pumping would not be required if the route he located was followed, which involved a considerable rock excavation, but which meant that this area has enjoyed a gravity water supply to this day. Later, he served the District as Division Engineer in charge of construction of the sections which he had previously located.

On completion of the aqueduct project in 1919, he joined the Manitoba Drainage Commission and in 1922 became Manitoba Deputy Minister of Public Works, serving in this capacity to 1927, when he was appointed Manitoba Power Commissioner for the next five years, when over 1,000 miles of power lines were built in the Province.

He worked with Mr. W. P. Brereton and Mr. W. S. Lea on preliminary work for the Greater Winnipeg Sanitary District in 1934 and in 1937 took charge of the construction of the District's Treatment Plant and Collection System. On completion of the work in 1938, he was appointed Superintendent of the Greater Winnipeg Sanitary District, retiring in August, 1956. He was brought back as Resident Engineer in charge of the construction of the Greater Winnipeg Water District Second Branch Aqueduct in 1959-60 to complete the work on the water supply which he had helped initiate fifty years previously.

Douglas L. McLean was a life member of the Engineering Institute of Canada and the Western Canada Water and Sewage Conference and in 1953 the Federation of Sewage and Industrial Wastes Associations conferred on him a signal honor, the Arthur Sidney Bedell Award, for outstanding personal service in the Sewage Works Field.

Those engineers who had the privilege of working with him will long remember his qualities and all residents of this Province will continue to benefit for many years from the engineering works constructed under his direction.—R.C.S.

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FULL TIME REGISTRAR

At the Council meeting on June 10, 1964, it was resolved that Council would take the necessary steps to retain the services of a full time Registrar. This resolution was endorsed by the Committee Chairmen at a meeting on June 11, 1964.

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Congratulations to Managing Editor Bob Kirk and Mrs. Kirk on the birth of a son, Robert Allen.

THE GRAND RAPIDS GENERATING STATION

By J. H. C. WILSON, P. Eng.

MANITOBA'S NEXT SOURCE OF POWER

Manitoba Hydro's next addition to system capacity will originate from the Grand Rapids power site which has been under construction continuously since the spring of 1960. The site is located approximately 250 miles northwest of Winnipeg near the mouth of the Saskatchewan River where it discharges into Lake Winnipeg. The project is currently at an advanced stage and the scheduled in-service date of late 1964 for the first generating unit appears to be within reach. The second and third units will follow in sequence with final completion expected during the summer of 1965. When Grand Rapids power is integrated into the southern network, the total system capacity will be increased by approximately 40 percent.

GENERAL ARRANGEMENT OF DEVELOPMENT

Reservoir and Dykes

When impounding which will commence this summer is completed, a reservoir area totalling 2,040 square miles will be created in the Cross Lake, Cedar Lake and Moose Lake areas of the Saskatchewan River drainage basin. A full supply forebay level at elevation 842 feet will provide an average head of 122 feet for plant operation. By operating the reservoir through a 10 foot range, water storage equivalent to approximately 134,000 cfs/months will be available as usable energy. The eastern limit of the reservoir is confined by six major dykes varying in height up to 100 feet and extending a total distance of 16 miles. In addition seven small freeboard dykes have been constructed in low areas. Dykes are of homogeneous earth fill design protected from wave action by coarse rock rip rap and from erosion downstream by a granular slope protection material. Adjacent to the spillway and intake structure, where dykes reach their maximum height, the design provides a central impervious core flanked on both sides by supporting zones of rockfill. Dykes have been constructed to crest elevations varying between 852 feet to 854 feet. The freeboard allowance above elevation 842 feet is increased, depend-

ing upon the degree of exposure and will prevent destructive overtopping due to wind set up and wave action.

Spillway

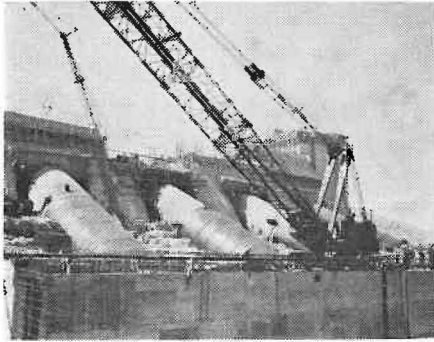
The completed spillway structure is located in the river channel at the head of the rapids approximately three miles upstream from the powerhouse area. This structure was designed for a flood discharge of 140,000 cfs at normal maximum reservoir level, with regulation being effected by four vertical lift spillway gates. The gates, operated by wire rope hoisting apparatus, will be normally closed and water spillage will only be necessary during periods of high flood.



An aerial view of the spillway in the river channel looking upstream. Concrete placing for the rollway in No. 3 opening was in progress at the time the photograph was taken in the fall of 1963.

Intake and Penstocks

An intake channel 570 feet wide and up to 28 feet in depth requiring 2.5 million cubic yards of excavation, mainly in rock, has been cut through the high ground in the immediate forebay area. Its purpose is to improve hydraulic conditions, and to reduce water velocities thereby inducing the formation of a solid ice cover immediately upstream from the intake structure during winter operations.



Construction progress showing penstock erection in the summer of 1963. The upstream wall of the powerhouse substructure is in the foreground with the placing of mass concrete for the intake structure underway in the background.

This will minimize the hazard of frazil ice. The mass concrete gravity type intake structure abuted by dykes will convey water from the forebay into 29 foot diameter steel lined penstocks which are encased in concrete and covered by rockfill. Flow to each penstock is regulated by two vertical lift gates per unit, each measuring 16 feet wide x 36 feet in depth. A feature of these gates is the hydraulic hoisting system with vertical movement being accomplished by a fixed cylinder and movable piston installed within the gate.

Powerhouse and Tailrace

The powerhouse will have an initial installed plant capacity of 328 megawatts consisting of three 150,000 H.P. Kaplan turbines with 115 MVA generating units. Provision has been made for the future addition of a fourth unit with only the turbine rotating parts and the generator unit being required to complete. It is of interest to note that the variable pitch blade turbines are the largest Kaplan type units either in operation or under construction in Canada, and are among the largest in the world. The Kaplan turbines provide high efficiencies over a wide range of operating heads and machine loadings. Considerable economy is being achieved in using these very large units, a feature which could not have been taken advantage of previously because of the limitation imposed by Manitoba Hydro's total power system capacity in relation to individual unit capacity. The tailrace channel excavated in an existing flood overflow channel will discharge water from the turbine draft tubes to the Saskatchewan River and thence into Lake Winnipeg.

Transformation and Transmission

Nine single phase 30/40 MVA transformers located on the tailrace deck of the powerhouse are designed to transform power from 13.8 kV to 230 kV where it will be transferred by overhead conductors to the switching station located downstream of the powerhouse. Two steel tower lines provide duplicate single circuit 230 kV transmission to the southern Manitoba network. An intermediate switching station at Ashern, Manitoba, will also provide a connection to a 230 kV wood pole H frame line leading to the Dauphin Area.

Foundations and Grouting

Preliminary site investigations confirmed that an extensive curtain and consolidation grouting program for the control of subsurface water flows and foundation consolidation would be required. The region is underlain by a sequence of Paleozoic dolomitic limestones with infrequent but nevertheless significant thin horizons of silty clay layers. Several of the strata are classified as fragmental which have subsequently proven to be difficult to grout using the standard cement grout mixes. Due to the scope of work required in constructing a grout curtain along the full length of the major dyke lines and beneath the hydraulic structures, it was essential that an early start be made on this phase of the work. Grouting commenced in 1960 and operations have continued on a 24 hour a day basis, winter and summer, until final completion was accomplished in the spring of 1964. The total quantities of drilling in rock and overburden is approximately 2,400,000 lineal feet, with some 2,200,000 cubic feet of Portland cement grout injected into the drill holes.

IMPORTANT CONSTRUCTION ASPECTS

Prior to commencing construction, important aspects were recognized relating to the vast scale of the project and the tight schedule imposed by the requirement of initial generation by the time of peak power demand during the winter of 1964-65.

Subsurface Investigations

In 1959 a detailed subsurface investigation program was undertaken to supplement earlier investigations carried out in 1954-55. Diamond drill holes averaging 190 feet in depth were located every 1000 feet along the axis of the dyking system. A closer spacing was utilized in the areas where structures are now located. Foundation conditions were assessed

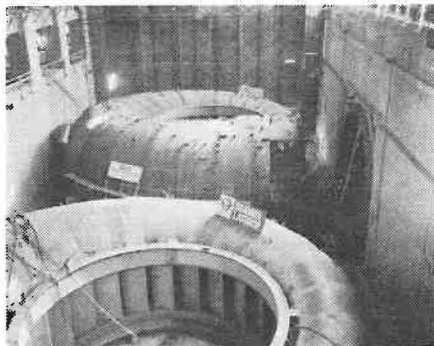
by the examination and correlation of rock cores and by careful study of the results of water pressure testing and vertical water flow measurements in drill holes. Holes were water pressure tested progressively by isolating sections of the hole by the use of expansion packers set to the desired upper and lower elevations. In addition the velocity and direction of groundwater flow and the nature of the aquifers present in the limestone strata were studied by means of a small diameter vertical flowmeter which was lowered into observation holes. The collection of data has continued during the entire construction period and will be carried on during impounding and after the full supply level of the reservoir is reached. The overall program has proven invaluable in establishing the extent and depth of the grout curtain and the consolidation grouting requirements. During subsequent years the continuing observation program will assist in detecting any deterioration in the effectiveness of the grout curtain or changing foundation conditions.

Curtain Grouting

In 1960 the first of three grouting contracts was awarded. As the initial grouting program was considered to be somewhat experimental, a variety of methods and techniques were specified. The results established the best methods for the construction of an effective grout curtain to prevent excessive subsurface leakage from the reservoir. These methods were utilized in preparing specifications for the subsequent grouting contracts. The cost of the completed grout curtain, excluding consolidation grouting and unwatering curtains, now totals approximately fourteen and one half million dollars and is believed to be one of the largest undertakings of its kind ever attempted. The project schedule required the construction of dykes and grout curtain to run concurrently. It was necessary, therefore, that Dyke No. 2 North be constructed prior to curtain grouting. In all other cases the curtain grouting work was completed before dyke construction was commenced.

Powerhouse and Intake Excavation Unwatering

The powerhouse excavation in rock extended down to elevation 626, some 90 feet below the elevation of Lake Winnipeg. The intake excavation although only to elevation 720 feet, was located on the edge of an escarpment which showed evidence of numerous active springs before construction commenced. It was recognized that unwatering of the excavations for the intake structure, pen-



A view from inside the powerhouse in the winter of 1963 showing a portion of Unit No. 1 turbine stay ring with the spiral case welded and ready for concrete embedment. In the background scroll case plates for Unit 2 are being assembled with the connecting portion to the 29 foot diameter penstock on the left not completed at that time.

stocks and powerhouse would require special treatment. A horseshoe shaped unwatering grout curtain was constructed, consisting of three parallel rows of closely spaced holes involving about 100,000 lineal feet of drilling and the injection of approximately 100,000 cubic feet of grout solids.

A special procedure was used to grout the fragmental strata. Holes were drilled in groups of four to six and washed with water and jets of air to establish cross connections, if possible, between holes within the group. Multiple connections were used for grout injection and holes were simultaneously grouted. The unwatering grout curtain reduced subsurface leakage into the excavation to the point where the General Contractor's pumps could keep the area unwatered during the construction period. Pumping will continue until the tailrace is flooded.

Source of Construction Materials

An important aspect of the project was to confirm the existence of an adequate source of supply for the large quantities of dyke materials and suitable concrete aggregate required to complete the project.

In 1959, in conjunction with the subsurface investigations, gravel pits, quarries and borrow pits for impervious dyke fill were surveyed and complete details concerning types of materials and available quantities were included in the tender documents. In all, eight impervious borrow pits, eleven gravel deposits and three rip rap quarries, were used

to supply some 9 million cubic yards of dyke materials. Included in this total was approximately 2 million cubic yards of rockfill obtained from the intake channel excavation. The dyke design for the higher sections included a supporting zone of rockfill which flanked the central impervious core. The design comprehended the quantities of rock available from the intake channel excavation and upon completion of the work excavated rock hauled to waste disposal has been minimal.

Aggregates for the production of some 360,000 cubic yards of concrete presented a problem. With the aid of air photo interpretation, a comprehensive ground search and the field testing of natural gravel deposits, abundant in the general area, was undertaken prior to calling for tenders. Natural deposits were located containing sufficient quantities of granular materials which could be processed to yield suitably graded concrete aggregates. Unfortunately the better deposits were located at the limits of economic haul distances and access road construction would have involved considerable expense.

Concurrently with the search for natural aggregates, the possibility of manufacturing concrete aggregates from the limestone bedrock in the immediate vicinity of the project was investigated. Five tons of quarry rock was sent from the site to the Minerals Processing Division in Ottawa and a very comprehensive series of tests were performed, using products produced from jaw crushers, rod mills and impact mills. The tests established that satis-

factory coarse aggregate and sand for concrete could be produced from the proposed quarry material. The impact type mill was found to produce a sand with particles of the desired cubical shape which would require less mixing water and consequently less cement than equivalent materials having a high percentage of elongated particles.

The General Contract specifications were written to permit the use of processed natural materials or a manufactured product from quarry rock. The successful tender elected to manufacture the concrete aggregates from quarry rock, presumably on the basis of economy. It is believed this was the first occasion that manufactured sand has been used in Western Canada and with the work virtually completed the methods used have proven to be most satisfactory from the point of production capacity and conformance to material specification requirements. Although the manufacture of concrete sand was viewed with some concern in the planning stages, experience has shown it to be a very acceptable alternative to using natural products.

Current Status

The total cost of the completed project is now estimated at 125 million dollars with 102 million dollars required for on-site work and the remainder for transmission, associated terminal facilities and communications. Expenditures for on-site work to date amounts to some 80 million dollars.

The major outstanding items of work re-

9th Annual

FALL FROLIC

A.P.E.M.

Club Copacabana - Friday, Oct. 2nd, 1964

SMORGASBORD at 7.00 p.m. — DANCE until 1.00 a.m.

● *Annual Awards*

● *Live Entertainment*

(Great Shakespearian Festival)

MARK OCTOBER 2nd ON YOUR DATE CALENDAR!

late to equipment installation. At the present time the erection of the first turbine and generator unit is progressing satisfactorily. The turbine embedded parts for Units 2 and 3 are in place and the scroll case for Unit No. 4 is being welded in position. Generator foundations are complete for Unit No. 2 and concrete embedment of Unit No. 3 scroll case is under way.

The spillway structure including gate installation is complete and the intake gates are now ready for installation. It is anticipated initial forebay flooding can be commenced by the middle of June.

A program of stage flooding has been established. The topography of the area permits this procedure by using a temporary intake cofferdam now constructed at the upstream end of the channel. Initial closing of the spillway gates will raise the water elevation and allow flow through a sandbagged wier in the cofferdam. When the water is impounded against the intake structure to approximately elevation 809 feet flooding will be discontinued for a short period of time to permit inspections and observations to assess the conditions of the grout curtain and to ensure an adequate intake gate seal has been achieved. After this period of observation, the second stage of impounding to full supply level will commence with the removal of the intake channel cofferdam. The forecast of flows in the Saskatchewan River for the coming year derived from the study of current snow surveys and spring precipitation records in the upper regions of the drainage basin indicates the reservoir will approach its full supply level by the time the first unit is commissioned in late 1964.



COUNCIL MEETING

Present at the May 6, 1964, meeting were Messrs. S. J. Borgford, O. Marantz, T. E. Weber, R. T. Harland, and W. H. Finnbogason. There had been an Executive Meeting the week before with the object of achieving more in less time at this full Council Meeting.

However, it was still necessary for Council to spend a considerable amount of time dealing with membership applications from candidates with marginal qualifications.

A report was received, by Council, concerning a Regulation made under the Construction Safety Act. Studying and reporting on this Provincial Department of Labour proposal on behalf of the Association were Messrs. W. J. Adams, E. I. Lexier, and W. H. Milley. This report was forwarded to the De-

partment with a covering letter stating that only a very limited amount of time had been given, by the Department, for the studying of this Regulation.

A Public Relations Committee suggestion that the Association needed an additional staff member was not discussed by Council, but referred to the Committee studying the functions of the Association. It had been suggested that the Association needed a staff member to represent Council at various functions.

A letter of resignation was received, by Council, from Oscar Marantz, the Association's Secretary-Treasurer and Registrar, Mr. Marantz is to study at the University of California for one year. Council expressed appreciation of the work done by Oscar Marantz. Mr. Weber was appointed to the vacant post for a period of one month. This temporary appointment was made so that Council could receive the report on the Association prior to making a more permanent appointment.—B.W.



COMMITTEE CHAIRMEN MEETING

By G. R. KIRK, P. Eng.

A very successful dinner meeting was held for Committee Chairmen on March 16th at the Fort Garry Hotel. All fourteen committees were represented by the Chairman or his representative. Council was represented as well.

Following supper the President discussed the future of the profession, the problem of public recognition and his trip to the annual meeting of the Ontario Association. The newspaper coverage given the Ontario meeting was discussed with regard to increasing the interest of the public and of the members in our own annual meeting. In particular, the use made of panel discussions at the Ontario meeting was of great interest to the committee chairmen.

Each committee chairman then gave a report on the activities of his committee to date and the plans for the future. Following every report a general discussion took place with suggestions from the other chairmen being given and new ideas promoted. Many committees suggested that Council provide them with terms of reference so that they could better understand the work they were required to do. Some also suggested that a central file be established so that minutes from all the committee meetings held by each committee could be retained. Continuity could then be maintained from year to year, even though membership of the committee changed.

The meeting adjourned after two and a half hours with the President stating he would investigate the possibility of holding a similar meeting in the Fall.

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CLOSER TIES SOUGHT BY BRANDON ENGINEERS

Fifty to sixty Professional Engineers in the Brandon area find little opportunity to participate in the affairs of their Association. There is no local organization of the Association and their only contact with their fellow engineers is through the *Manitoba Professional Engineer*. Feeling that something should be done to remedy this situation, the group recently appealed to Council to consider ways and means of establishing closer ties.

On April 15, a delegation from Council consisting of President Chappell, Vice-President Borgford and Councillor Rettie attended a dinner meeting with Brandon members of the A.P.E.M. Discussion centered about ways of creating closer bonds between this group and the main body of practicing engineers who are mostly located in Winnipeg.

Mr. Art Fraser, chairman of the meeting welcomed the delegation and said it was the first time the Brandon group had been visited by Council. He indicated the Brandon group were gratified at this evidence of Council's interest in their problems.

Mr. Chappell addressed the gathering upon the purposes of the A.P.E.M. and how Council was attempting to fulfill these purposes. He indicated his belief that while one of our first requirements was to administer the Act, the Association had now grown to the point where it could consider expanding its role through service to and technical development of its members.

Following Mr. Chappell's address the Brandon group expressed a unanimous interest in establishing closer ties with their fellow members throughout the province and asked the delegation for suggestions as to how this might be done. One of the suggestions discussed was the possibility of establishing chapters of the Association which it was felt would greatly strengthen the organization at the local level.

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Congratulations to Kenneth Hallson and Mrs. Hallson on the birth of a son, Paul Kenneth, on March 24, 1964.

Flin Flon News

By M. N. COLLISON, P. Eng.

The two most important items deal with affairs of the Hudson Bay Mining and Smelting Co., Limited, wherein W. A. Green, P. Eng., has retired as President. His retirement follows many years of service, dating back to the 1926 period when Flin Flon was not even in existence. Mr. and Mrs. Green are now on a three-month tour of various Anglo-American mining properties in Africa, having sailed from New York May 6th on the Queen Elizabeth.

The second item relates to Eric S. Austin, P. Eng., who has been appointed Executive Vice-President of Hudson Bay Mining and Smelting. Eric has been with the company since 1933.

In addition to the previous two events, W. A. Morrice, P. Eng., has been appointed General Manager. Sandy has been Assistant General Manager since 1961 and prior to that, was General Superintendent and Superintendent of the Flin Flon Mine.

Gordon Carss, P. Eng., engineer for the Town of Flin Flon, has gone into the model railroading business since he has won an "S" gauge layout. It was produced by the local Kinsmen Club and presented to Gordon, by lot, at a recent Car Show. At this date no definite answer can be given as to whether Gordon or his two boys are getting the most out of the railroad.

R. L. Price, P. Eng., has again shown his prowess as a producer of musical shows with the staging, late in April, of Finian's Rainbow. Ron would like very much to tie in the "Pot of Gold" at the end of the rainbow with a new mine.

Bart Fairbairn, P. Eng., is once again back in the "Do-It-Yourself" clan, having undertaken to construct a concrete basement under an existing house.

Yours truly, along with Mrs. Collison, attended the Convocation Exercises of the University of Saskatchewan on May 12th, at which time daughter Barbara received her B.A. degree.

For the past week and a half I have been walking around on a "foot and a half" as the result of having stepped on a nail, which is now healing nicely, thank you.

Editor's Note—We're glad the nail is mending, Mac. How's your foot?