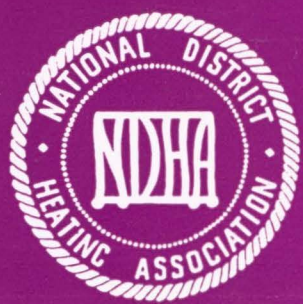


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NEW TOTAL ENERGY SYSTEM IN OMAHA, NEBRASKA

This article, entitled "Northern Natural Increases Gas Load With Total Energy Systems" by Bill Quarles, is reprinted through the courtesy and with the permission of PIPE LINE NEWS.

Northern Natural Gas Company, through one of its divisions, Energy Systems, is applying an interesting concept for natural gas marketing. A concept which shows promise of adding to the gas industry's off season gas load. Energy Systems is constructing a new plant and pipeline system to provide both heat and cooling to a number of buildings in downtown Omaha, Nebraska.

Centralized heating plants are not by any means new. In fact a number of the present gas distribution companies originated in this manner; a company providing steam or hot air heat to a number of customers in a concentrated area.

The chilled water aspect of the project, as well as the capacity of the system and the expected gas load, summer and winter, is indeed a departure from the old concept of a centralized heating plant distributing steam to a number of customers.

The plant which will provide steam and chilled water for Energy System's customers, is located at 22nd and Howard Street, in downtown Omaha, a few blocks from Northern Natural's main office. Plant is 210 x 80 ft, with an outer shell 120 ft high to conceal cooling towers located on the roof.

Equipment, currently being installed in the facility includes:

- 2—Carrier 17DA 5,000-ton chillers, each with a EPG6 Elliott steam turbine.
- 1—Carrier 17M 2,000-ton chiller, with a 2EO2 Elliott steam turbine.
- 3—Combustion Engineering Company type 30VP12W boilers, each with 125,000 lb/hr continuous maximum steam pressure. Maximum pressure is 715 psig, with maximum discharge temperature of 750 F.
- 2—750KW Solar Saturn generators, model GG 1000.

With these generators, the Energy Systems facility, itself is a "Total Energy" installation, as well.

Present load committed for the steam and chilled water distribution system is below the designed capacity. Additional load is expected to develop, both from conversion to this concept from existing buildings in the area, as well as from scheduled new construction. The Northern Natural office building is, of course one of the principal customers of the Energy Systems installation.

Steam heat through the underground pipeline system is expected to be available for customers about October 1, 1967. Chilled water service for air conditioning will be available shortly after January 1, 1968.

As an overall construction project, it is a tremendous undertaking, requiring a substantial investment in the millions. As a pipeline construction project, length of the

system is relatively unimpressive; approximately three miles of pipe altogether. But this is about the only unimpressive feature of the job.

CONGESTED AREA IS PROBLEM

Any pipeline project in a congested, downtown area, is a major undertaking. But when it is one pipeline wide, and four pipelines deep, including two 30-in. lines, all laid in the middle of city streets, problems compound faster than a computer can calculate. This just about describes the Energy Systems project. Two 24- to 42-in. chilled water lines, a 16- to 12-in. steam line and a 8- to 6-in. condensate return line, all laid in the same ditch.

Work is of such magnitude, that one prime and three subcontractors were assigned the pipeline work alone. Martin K. Eby Construction Co. was awarded the general contract for the pipeline construction. Subcontracts were assigned to the Narkin Company (pipe welding and mechanical); Land Paving Company (replacing pavement); Permaduc International, Inc. (Permaduc installation and steam line insulation). Eby Construction handled the excavation and backfill on the project.

Construction on the pipeline section of the project could proceed only one block at a time because of strenuous objections from property owners and city officials. Each operation was completed, from excavation through setting the manhole covers and final paving, in a single block before the contractors could move ahead.

First step was cutting the old pavement, which included blacktopping, concrete and the original brick street surface, then removing the debris and trucking it away to dump areas. This was done with both self-propelled paving breakers, and concrete cutting saws. Paving breaker or hand held jackhammers were then used to punch a series of holes in the pavement between the cuts so a hydraulic backhoe could break up the fragments and load them on dump trucks.

Ditch was excavated to provide sufficient width for the two 42-, 36-, 30- or 24-in. chilled water lines, depending on which was used in the various locations. Width allowed for a minimum 12-in. spacing between the two parallel lines, plus 6 in. separation between the ditch walls and the outside of each line. Depth ranged up to 16 ft.

The 30-in. pipe, used on most of the project, was provided in standard 40-ft random lengths, in .375" w.t. Ends were standard land and bevel for welding. Line pipe was provided to the contractor with yard-applied coal tar enamel, glass reinforcing and felt and kraft outerwrap. Inside of the joints was lined with Pittsburgh Chemical's Tarsel. Midwest Pipe Coating did both the wrapping and inside lining of the pipe. *(Continued on Page 66)*

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JOINTS WERE STOVEPIPED

During construction, two joints were stovepiped into place, simultaneously, in the ditch. The .375" w.t. pipe was then welded with CO₂-wire. Joints were aligned with an outside line-up clamp for welding. When these two joints had been welded into place, two more were lined up, then the process repeated. Each of the completed welds were radiographically inspected.

Before the pipe was placed in the ditch, the general contractor first had placed selected backfill material in place, tamped it, then graded the bottom of the ditch line. Entire project was laid to grade.

After welding was completed, a worker was sent back into the line to apply Tarset coating to the weld areas. This was placed with a spray gun.

Laying and welding the large diameter chilled water lines progressed until work on this segment of the job had been completed for an entire block. Then the time-consuming part of the work began.

Ditch was backfilled with selected material, and then tamped to 100 per cent compaction until the dirt was 12 in. above the top of the chilled water lines. After this was completed, a 6-in. layer of reinforced concrete, the bottom of the Permaduc, was poured.

Steam and condensate return lines were then installed on top of the concrete portion of the Permaduc. These lines, varying from 16- down to 6-in. in diameter, were both stainless steel, U. S. Steel seamless pipe. Welding on these sections was done with the TIG process. And each weld again was checked radiographically before it was passed by Energy System's inspectors.

On this installation, however, pipe joints were laid in a series of roller supports, previously installed on the concrete. These rollers held the pipe from the concrete, allowed space for insulation between the joints and the Permaduc, and permitted contraction and expansion of the two lines. The stainless steel pipe was installed bare.

After the stainless steam and condensate return lines were installed, the Permaduc installation was completed. This consisted of setting forms for the sides and top, and pouring in one operation. After concrete had set, insulation was blown into the Permaduc, and manhole and vent installations completed.

Again the line was backfilled with selected spoil material, and tamped to 100 per cent compaction. Paving patching then was completed, and the contractors moved ahead to the next block, where the entire operation was completed.

Final check on quality of the welds and the pipe was done with hydrostatic pressure, to 300 psig.+

NDHA EXECUTIVE BOARD MEETING OF SEPTEMBER 14 and 15, 1967

The NDHA Executive Board, and Standing and Technical Committee Chairmen, met at the Pittsburgh Hilton Hotel on Thursday and Friday, September 14 and 15.

On Thursday morning at 9:30, the three Divisions of the Board — Advisory and Planning, Operating, and Administrative and Financial — met in individual groups to confer and consider the items of business on the agenda with which they were concerned. At 11:00 A.M. the Board went into Executive Session until noon.

The regular Thursday luncheon was held in the King's Garden Dining Room of the Hilton; all local NDHA members were invited to attend.

Board members and Committee Chairmen convened in the Rivers Suite Meeting Rooms, where President Donald Brandt called the meeting to order at 2:00 P.M. Several guests were also in attendance.

On the agenda for the afternoon session were the following items of business: (1) Approval of the Minutes of the two June meetings; (2) Secretary-Treasurer's Report which included among other things, the presentation (and approval by the Board) of the financial report for the first eight months of the year, and the prediction of income and expenses for the last quarter of the year; (3) Publication Committee Report; (4) Membership Committee Report; (5) Advisory and Planning Division Report (First Vice-President Whirl, Chairman) which included reports on future annual meetings, selection of the time and place for the Spring 1968 Executive Board Meeting (March 14 and

15 at the Pittsburgh Hilton Hotel), consideration of and a decision to revise the format of the Annual Statistics Report, and various other business coming under this Division's jurisdiction; and (6) the Operating Division Report (Second Vice-President Megley, Chairman) which included a financial and general report of the 1967 Annual Meeting by the General Chairman of the Meeting, William Gillim, and a report of the Meeting Critic, John Levergood, and a complete to-date resume of the technical program and other plans for the 1968 Meeting by the technical and standing committee chairmen and the General Chairman.

On Friday morning President Brandt called the meeting to order at 9:00. The Administrative and Financial Division under the chairmanship of Third Vice-President Curly reported and the following business was transacted: (1) a preliminary budget for 1968 was presented and approved; (2) the Board approved a recommendation that 1968 membership dues remain at the same level as in 1967; (3) consideration of the investment of the Association's surplus funds; and (4) recommendations made by the Association's auditing firm were discussed and acted upon by the Board.

UNDER OLD BUSINESS — A report on the progress of the 4th Edition of the Handbook was presented by Educational Committee Chairman William Gillim, and individual reports were given by the technical committee chairmen who are the authors of the various chapters.

Several items were brought up and discussed under New Business, after which the meeting adjourned.+