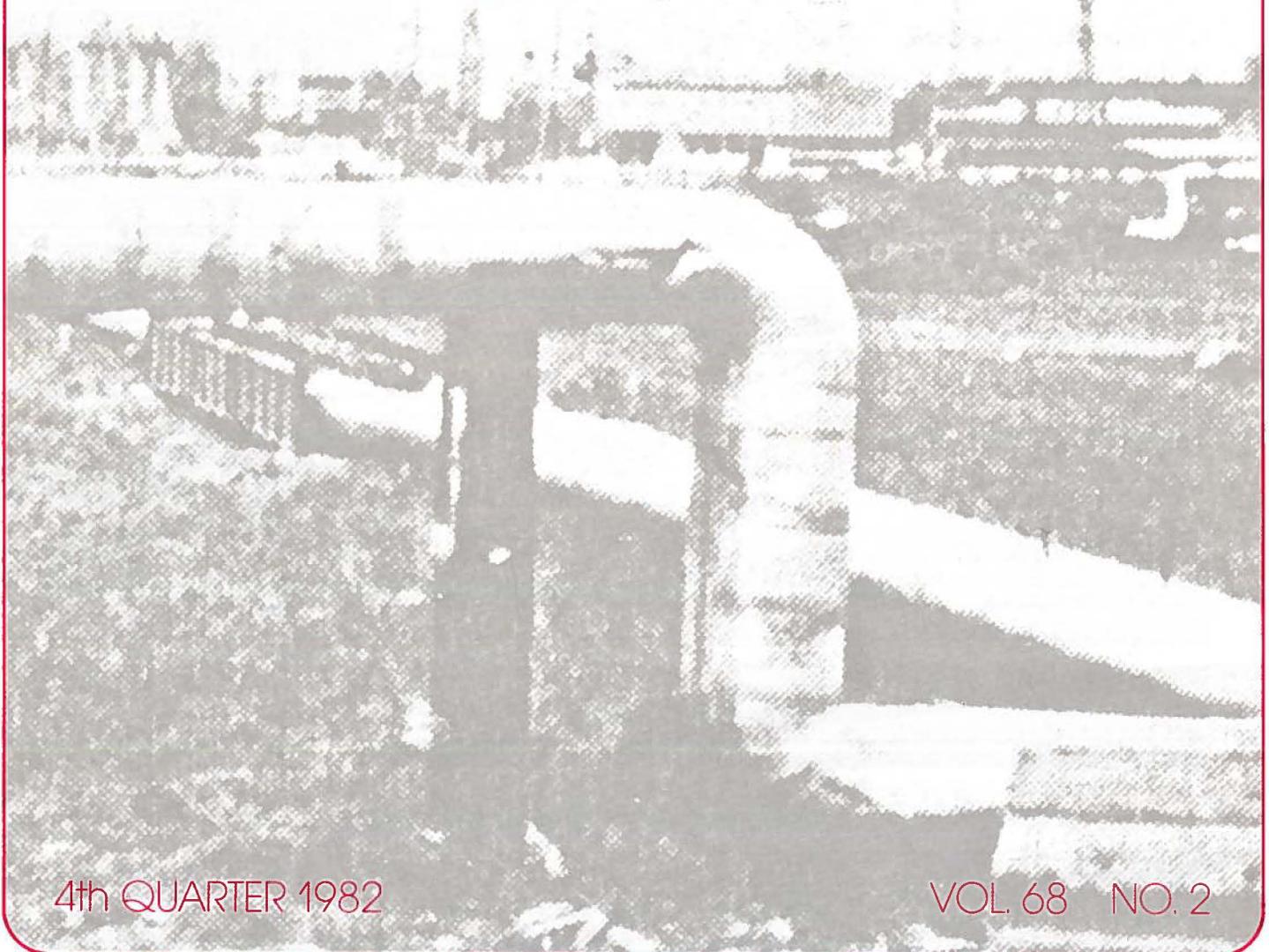


DISTRICT HEATING

**Report on V International DH Conference
New DH System Economics Vary With
Supply Temperature**



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V International District Heating Conference

by Clem Crooks, Baltimore Gas & Electric Co., President of IDHA

It was my pleasure to represent IDHA at the V IDHC held in Kiev, the capital of the Ukrainian Soviet Socialist Republic, in September, 1982. The conference was sponsored by the Soviet Organizing Committee and the International District Heating Committee which is supported by the international engineering organization REHVA (the European equivalent to ASHRAE) and UNICHAL. All participants were made welcome by the very friendly officials of the conference and by the Soviet people in general.

The theme of the conference was design, construction and operation of large district heating systems, and was attended by approximately 600 delegates representing countries the world over. Most were from the European and Scandinavian countries and the USSR with a smattering of delegates from other areas. There were four representatives from the United States.

Registration was conducted on Sunday and Monday with a reception/dinner on Monday for the International Committee. The conference opened on Tuesday morning with a general session that included opening remarks, the keynote address and greetings from some members of the International Committee. Simultaneous translation into English, Russian, French and German was provided at all sessions. Each participant received a portable head set which could be tuned to the desired translation. Since there is always a lag, and sometimes a considerable lag, the punch lines and the concluding statements did not reach the audience at the same time. This was a new and most interesting experience.

The technical program was divided into five sessions beginning Tuesday afternoon and continuing through Thursday.

1. Methodology of planning and forecasting of DH development on a country and regional scale.
2. Conventional and non-conventional heat sources.
3. Designing of DH systems for urban centers, populated and industrial areas.
4. Design, construction, and operation of heating networks.
5. Hydraulic and thermal conditions of DH systems.

The session was opened by the chairman, followed by the general speaker, and then each author was allowed seven minutes to summarize his paper. Less than half of the total of 121 papers were presented by the author. Nearly one third of the papers were by Soviet authors. Written questions could be submitted to the chairman or author before the session started. The questions were addressed at the end of the session if time prevailed, or later at a separate meeting. Each session was closed with a summary by the chairman.

In addition to the conference sessions there were numerous technical tours — a combined heat and power plant, a hydro project, and other institutes and manufacturing plants. There were also general excursions to historical sites, monuments, museums and exhibitions. All tours were conducted with guides/translators well versed in English, French or German.

On the tour to the Kiev Hydroelectric Project which is the uppermost of the six hydro plants on the Dnieper River, the delegates were warmly greeted by the plant personnel and served refreshments before touring the facility. The operating engineers did not speak English so all discussions were carried on via the guide/translator. The power plant consists of 20 units; 4 at 16.3 MW placed in service in 1964 and the remaining 16 units at 18.5 MW installed by 1968 for a total capacity of 361 MW at a maximum head of 12 meters (39 feet). All of the units at Kiev are of the bulb-type horizontal-shaft where the water completely flows around the generator. The total capacity of all six plants on the Dnieper River is 3671 MW and accounts for about 10% of the total installed capacity of the Ukrainian power stations. In addition to the basic function of generating electricity the power dams on the Dnieper River (each have shipping locks) have improved navigation and the water supply to populated and industrial areas, and provide water storage for irrigation purposes.

A short distance upstream is the Soviets' first pumped storage operation consisting of six turbines, three of which are reversible, for a total capacity of 225 MW at a maximum head of 70 meters (230 feet). Construction of the reservoir began in 1961 and the project completed in 1970. The reservoir can be emptied in three hours and refilled in seven hours and usually cycles each day generating at the morning and evening peak periods and pumping at night.

As part of the conference all delegates and guests were taken on tour of Kiev via a river boat on Tuesday. The evening was most pleasant and the view of the city was magnificent with the setting sun reflecting on the golden domes of Kiev. The river is very clean and is used for recreational purposes as well as part of the transportation system, particularly the high speed hydrofoils that make scheduled runs.

The closing session was held on Friday morning with the usual concluding remarks and summaries by the Soviet hosts and other members of the International Committee. The entire conference was quite different from the normal experience with conferences in the U.S.A., not just because of the language barriers and the mechanics of translation, but because of the different format, the great



Hydrofoil on Dnieper River.

attention to detail and protocol and the large number of papers most of which were not presented in person. The major benefit with this type of conference as with any conference is the personal contact with other people. Communication was difficult at times due to language differences but not an insurmountable problem. I renewed acquaintances with delegates that attended our 1978 International Conference at the Homestead in Virginia, as well as made new friends, and extended an invitation to come to the United States in 1984 for our next International Meeting.



Entrance to Tashkent Combined Heat and Power Plant with sign welcoming delegates of the V International District Heating Conference.

Three postconference technical tours were offered visiting different areas of the USSR all terminating in Moscow. On Saturday, John Vandermolen, Allan Toole, Delbert Anderson (from Minnesota) and I left for Tashkent the capital of Uzbek which borders on Afghanistan. Tashkent is three time zones to the East, eleven hours ahead of EDT, almost half way around the world. The tour also included visits to Bukhara, Shakhrisabz, Samarkand and Moscow. Uzbek is in the Asian part of the USSR with a climate much like our Southwest — hot and dry with a short winter season. The people of Tashkent just celebrated the 2000th anniversary of the city; and Samarkand boasts of 2500 years of eventful history. The

people of Uzbek from the tour guides to the people on the street were very friendly. They were not at all like the stereotyped Russians that were expected and found in Moscow, but more like people from another world — the ancient crossroads of the world. Among the ancient ruins it was easy to visualize Marco Polo and the likes of Tamerlane and Genghis Kahn.



Allan Toole of Canada and others listen intently to the explanation of the operation of District Heating in Tashkent.

The delegates were again greeted with refreshments on the tour of the combined heat and power plant at Tashkent on Sunday afternoon. Even though the plant personnel were friendly and willing to answer questions, the taking of photographs in and around the plant was not allowed. Construction on this plant was started in 1961 and the last of twelve identical 160 MW units was completed in 1971. There is an extensive hot water district heating system in Tashkent. A unique aspect of the system is the one way open ended takeoffs for hot water for domestic purposes. The water is potable, but not very tasty for drinking due to a lack of salt.



Power Plant Personnel and Uzbek Power and Electrification Officials explain the operation of the Tashkent Combined Heat and Power Plant.

The flight to Moscow was quite a thermal shock — leaving the hot desert area with temperatures over 32°C (90°F) and arriving in Moscow that evening where the temperature was 13°C (55°F) with the Muscovites expecting their first frost any day. The first snows of winter fall in October.

The tour of the Moscow DH System, which celebrated its 50th anniversary last year, started at the headquarters building with an explanation of how the system operated including many technical facts and figures. Visits to the central control room, a district control facility, a construction site with above ground piping were included, but the tour of a pumping station had to be omitted due to lack of time. With the inherent concepts of DH in the United States; it is hard to conceive that a city the size of Moscow with 8,000,000 people has an 80% saturation of DH. The city is divided into twelve districts, each with its own plants. The distribution systems are interconnected; but the valves are normally closed except for emergencies. There are 2400 km (1490 miles) of hot water piping with 20 pumping stations moving over 270,000 cubic meters per hour (1,200,000 gal per min) at 12-15 atmospheres of pressure (176-220 psig) in pipes up to 1400 mm (55 inches) in diameter supplying over 42,000 apartment buildings plus other commercial and industrial facilities. Supply and return temperatures are 150°C (302°F) and 70°C (158°F) in the winter and 72°C (162°F) and 48°C (118°F) in the summer. Present capacity is 24,000 gigacal/hr. (96 billion Btu per hr) with a total annual output of 70 million gigacal (280 trillion Btu per hr). Ninety percent of the piping is underground. The system is expected to grow at the annual rate of 70-100 km (43-62 miles) of main and 800-1000 gigacal (3.2-4.0 billion Btu) through 1990. There are also 57 km (35 miles) of steam mains supplying industrial facilities at pressures up to 12 atmospheres (176 psig).

Low sulphur coal, gas, and oil (3% sulphur) are used for fuels. No refuse is used for energy in Moscow. This is understandable, because there seems to be little refuse in Moscow. It is not a throw-away society like America. There are no paper bags at the stores and markets; shoppers must bring their own bags.

The cost of space heating and hot water is included in the apartment rent which is based on the amount of living area. The rent has remained stable for many years with the average being 8-10 rubles per month. This is equivalent to 11-14 U.S. dollars. However, electric usage is metered and billed separately. And like U.S. public housing, if it gets too hot — open the windows. The Soviets claim the system is self supporting; but there was not time to fully develop an understanding of this concept.

With the language barrier and the two-way translation it was difficult to conduct a highly technical conversation with the Soviets. Sometimes based on the question asked and the answer received, it was obvious the key meaning was lost in the translation. Basic facts and figures were translated with ease, but translation and understanding became much more difficult when dealing with concepts, ideas, and problems. In general, it is very difficult to apply Soviet DH concepts and policies to the United States. The observed technology is similar, but all of the political institutional and financial aspects are completely different. As a result it is practically impossible to make any meaningful comparisons other than size, quantity, etc.



Moscow District Heating System — 1400 MM hot water supply and return lines in vicinity of combined heat and power plant.

The tour concluded Saturday night with a farewell dinner and entertainment. It only took an hour to clear customs the next morning compared to over four hours on arrival mostly due to the large number of people and long slow moving lines. Even though the language barrier was not a great problem for basic communications, it was a great feeling to arrive in London and be able to communicate in English. It was even better to be back home in the States three days later. Attendance at the conference was a once in a lifetime experience and I greatly appreciate the sponsorship of IDHA as their representative.

Editor's Note: As part of the Annual Meeting Program in June, 1983, Clem Crooks will present a slide show of the conference and tours.

Mark your
calendar for the
1983 Annual Meeting
June 19-23
at
Host Farms
in
Lancaster, PA