

ELECTRIC POWER DEPARTMENT  
ANNUAL REPORT  
YEAR 1956

Electric energy produced in the generating facilities of The Cleveland-Cliffs Iron Company during the year 1956 amounted to 153,546,560 kwh. Of this amount, 127,261,913 kwh (82.9%) were billed directly by our company as follows: The Cleveland-Cliffs Iron Company - 90,876,458 kwh (59.2%) for its operations, 10,687,506 kwh (7.0%) for the operations of the Humboldt Mining Company, and 25,697,949 kwh (16.7%) were used by the Upper Peninsula Power Company. The hydroelectric plants of the Company produced 53% of the energy, the Presque Isle Plant of the Upper Peninsula Generating Company produced 29.7%, the Ishpeming Steam Plant produced 15.1% and the Ishpeming Diesel Plant produced 2.2%.

In addition to the 25,697,949 kwh (16.7%) billed from our company to Upper Peninsula Power Company, 26,284,647 kwh (17.1%) were delivered to that company by Upper Peninsula Generating Company and billed for our account by the Generating Company to the user in accordance with mutual agreements. Part of this energy was used in the area formerly supplied by The Cliffs Power & Light Company and part of it was transmitted to the Atlantic Substation of the Upper Peninsula Power Company for utilization in its Northern Division. Of the amount which we supplied to them, 50.6% was obtained by the use of our portion of the generating facilities of the Presque Isle Plant of the Upper Peninsula Generating Company, 41.6% was supplied by the Ishpeming Steam Plant, 6.5% by the Ishpeming Diesel Plant and 1.3% by the hydroelectric facilities of our company.

Our company, including the Humboldt operation, used 101,563,964 kwh, an increase of 13% over the amount that was used for these same operations in 1955. Even with this increase, the utilization of energy was about 20% less than was forecast for the year. An unforeseen strike in the mining industry of thirty-seven days was partially responsible for the reduction in energy consumption below the estimate. Contributory also were the curtailed operations of the Humboldt and Republic Mines. The construction and operating difficulties which were encountered at the Pelletizing Plant and the resulting delays caused thereby were also instrumental in reducing the energy consumption below the estimate.

These reductions in energy requirements below those which were anticipated tended to increase production costs of energy because of the burden of the fixed charges on the Company's portion of the Upper Peninsula Generating Company which it did not use for energy production. The reduction in energy use also caused a very appreciable reduction in the earnings which were paid to the Company by the Upper Peninsula Power Company because it enabled that company to take advantage of the unused energy at the Presque Isle Plant and avoid use of energy from our plants. Our company receives no earnings from its portion of the Presque Isle Plant when used by the Power Company but would receive earnings if that same energy were procured from our wholly-owned facilities.

In spite of these adverse conditions due to energy consumption being below the anticipated quantity, cost of energy to our company's operations, including wheeling charges, was reduced from \$.00914 per kwh in 1955 to \$.00872 per kwh during 1956. The total earnings before income taxes, however, dropped from \$166,405 in 1955 to \$89,091 in 1956.

The output from the Company's hydroelectric stations during the year was slightly below the expected normal and slightly below the output during 1955. Extreme drought conditions were experienced during the years 1946, 1947 and 1948. The drought cycle in the Upper Peninsula seems to be on a cycle of about eleven years. It is to be anticipated, therefore, that for the next few years hydro

production will be near or below average expectancy. The production during the year 1956 amounted to 81,477,396 kwh compared with a normal expectancy of approximately 85,000,000 kwh and an output during the year 1955 of 83,254,499 kwh. Precipitation in the Ishpeming area amounted to 25.52" compared with an average precipitation over a 44-year period of 30.75" and a precipitation of 30.82" during 1955. The reduction in precipitation, consequential in water available for hydroelectric purposes, would have caused a greater reduction in energy generated by the hydro facilities were it not for the greater economy of production which can be obtained in the hydro plants due to base load operations. Such operations are made possible by the greater loads on the transmission system and the additions of fuel-burning equipment which have been made during the past few years, particularly the addition of the Presque Isle Plant to our generating facilities.

At the beginning of the year, studies relative to the installation of a second unit at the Presque Isle Plant were being made by our company and the Upper Peninsula Power Company. To assist in these studies, the Upper Peninsula Generating Company had retained the Stone & Webster Engineering Corporation. Individual studies were conducted by all three companies and their findings were discussed in several joint sessions throughout the year. The findings of these joint discussions were brought before the Board of Directors of the Generating Company from time to time during the year and culminated in a decision reached at the Directors' meeting of October 9, at which meeting authorization was given to proceed with the engineering and financing which would be necessary for the installation of a second 22,000 kw unit in the plant. It was anticipated at that time that this second unit would be available for operation approximately January 1, 1959.

In view of the installation of the second unit in the Upper Peninsula Generating Company's plant, it was thought advisable to revise the basic agreement of July 15, 1953, between The Cleveland-Cliffs Iron Company and the Upper Peninsula Power Company. This revision was necessary to adapt the agreement to the changes which have taken place and which are anticipated in the system covered by the agreement. It was also anticipated that in the revision of the agreement, a different method of distributing costs could be obtained which would enable the generating facilities of the entire system to be operated in a manner which would provide the maximum system economy and the maximum economy of generation for both companies participating. Such a contract revision necessitated detailed load studies and numerous meetings between the parties involved. Such meetings were held from time to time in Boston, Cleveland and Ishpeming. The last such meeting held was in Boston on December 13 and 14, at which time it was decided to work out a final revision of the suggestions which had been made previously in regard to this agreement and forward them to the various interested parties in hopes that a satisfactory agreement could be reached immediately after the first of the year. These points were drafted and mailed out in the latter part of the year and a meeting was to be held in the early part of January for the discussion and possible adoption of a basic form of contract revision which was to become effective at the time the second unit at the Presque Isle Plant went into operation.

The Presque Isle Plant began commercial operation during October, 1955. During the ensuing months small difficulties were experienced, resulting in shutdowns from time to time for repair and correction of difficulties. These repairs were made on a temporary basis and the plant was kept in operation until a complete inspection and overhaul were conducted beginning April 17 and lasting until May 15. During this period both the boiler and turbine equipment were thoroughly inspected both inside and outside, and various additions and changes which had been indicated as being desirable were accomplished throughout the



plant. The plant was found in very good condition and it is anticipated that a similar complete inspection will not be necessary for the turbine equipment for a period of three or four years. It is, of course, necessary to have an annual inspection of the boiler plant for insurance purposes.

In addition to the general difficulties and minor operating problems which were experienced at the Presque Isle Plant, very high maintenance costs were being encountered in the pulverizing equipment which was obtained from the Riley Stoker Corporation as part of the boiler. The maintenance costs on this equipment were about five times as much as would normally be expected. Numerous discussions were held with the manufacturer as to the possible cause of this high maintenance, and the general consensus of opinion seemed to be that the difficulties were being caused by sand with which the coal had become contaminated as it was being piled for storage and reclaimed into the power plant. As a result of this decision, only new coal which had been very carefully handled to avoid sand contamination was burned in the plant from the latter part of the summer until the end of the year, during which time it was noted that a very radical decrease in maintenance costs was experienced. This test is to be continued into 1957 and the results therefrom will be used as a guide in the purchase of pulverizing equipment for the second unit and also as a guide for the manner in which the coal will be handled for the plant in the future. There was a serious accident to the pulverizing equipment on June 13, at which time an internal part failed and wrecked the entire internal portion of one pulverizer. It is not thought, however, that this failure was due to sand contamination but rather due to a faulty part and that no repetition of the accident will be experienced in the future.

The Presque Isle Plant was operated continuously during the year with the exception of the period from April 17 to May 15, when it was shut down for inspection and overhaul, and for the period from July 10 to July 31. During this latter period the strike in the iron ore industry had reduced the load on the system to the point that the Presque Isle Plant was operating below its economical load and it was deemed advantageous to shut down this plant during that period and utilize the Ishpeming Steam Plant. Rumors at the end of July concerning the resumption of operations by the mines caused the plant to be placed back in operation at that time, however, and it was continued in service.

The Ishpeming Steam Plant was inactive the greater portion of the time from the first of the year until the beginning of the inspection and overhaul of the Presque Isle Plant in April. During this period it was operated from time to time when difficulties were experienced in the Presque Isle Plant. On one of these occasions, which occurred on January 20, an attempt to start the plant disclosed a leak in a water wall tube in the combustion chamber of the boiler which had been caused by erosion. This was temporarily repaired at that time and later was given permanent repairs by a man from the Riley Stoker Corporation on February 20. On March 26, a complete inspection and overhaul of the entire plant was undertaken and the plant was placed in permanent service on April 17. Beginning of operations on April 17 was necessitated by the fact that the Presque Isle Plant was being taken out of service at that time, but by the time that the Presque Isle Plant was returned to service, load conditions had changed to the point that it was necessary to keep the Ishpeming Steam Plant in service. Its operations continued for the rest of the year with the exception of temporary periods of inactivity such as week ends, the first ten days of the iron ore strike, and similar conditions of low load requirements of the system.

During the early part of 1956, a committee was organized by various communities and industries in the Upper Peninsula attempting to negotiate for the extension of natural gas into the area from a line which is being projected into

the Menominee-Marquette area. Due to the large quantities of fuel which our company may need in the future for both electric energy production and the reduction of iron ores, our company took an active part in the promoting of this extension of gas service. There was some thought given at the beginning of the activity to our company joining with the Upper Peninsula Power Company for the purpose of transmitting the gas from the Wisconsin border. However, this plan was abandoned, but several meetings were held throughout the rest of the year with gas transmission companies in an effort to promote the construction of facilities by those companies. At the end of the year no definite commitments had been received from any company, but it is felt that there is a good possibility that such gas service may be made available to our company some time in the near future.

Due to the strike in the Westinghouse Electric Corporation plants, delivery of the equipment necessary to convert the McClure Power Plant to automatic operation was seriously delayed and installation of that equipment was not started until August and was completed about the middle of November. Prior to the installation of the automatic equipment, two cases of trouble developed which necessitated reduction in the operation of the plant. The first occurred during the month of January, at which time an attempt to close the main valve to the No. 2 unit resulted in the valve becoming jammed and the valve stem being bent. This necessitated the draining of the pipeline and the reinstallation of the valve stem. On May 19, the field breaker of the No. 1 unit opened for some unknown cause and the resulting induced voltage punctured the insulation in the field coils. This necessitated the unit being taken out of service and the rotor of the generator was sent to Milwaukee for re-insulation. It was returned and the unit was placed in operation on July 27. Several months later the field coils loosened due to the manner in which they were installed at the time they were repaired in Milwaukee. The concern which conducted the repairs corrected the matter in Ishpeming and the unit has been in operation since that time.

During the period that the automatic equipment was being installed in the McClure Power Plant, it was necessary to shut down each of the units from time to time to permit the attachment and installation of the new apparatus. During these periods both units were inspected and were found to be in such condition as to warrant complete dismantling and overhauling. These units were both overhauled during 1941 and there have been no extensive repairs or replacements on the hydraulic part of the generating units since that time. A complete overhaul of both turbines was accordingly scheduled to begin during January, 1957, and at that time both turbines will be completely reconditioned.

During 1954 extensive repairs were made on the concrete portion of the Carp pipeline. At that time there were several leaks in the pipeline which were not repaired and it was the intention of the Company to complete these repairs at its first opportunity. Load requirements on the system prior to the beginning of operation of the Presque Isle Plant, however, made such repairs impossible during 1955, but they were undertaken in 1956 beginning early in June. The repairs were conducted by Intrusion-Prepakt, Inc. throughout the months of June and July and were completed early in August. The pipeline is now in such condition that no future repairs are anticipated unless new leaks develop.

The contract with the United Steelworkers of America CIO expired on October 14, 1956. Our company had had a letter previous to that date, calling attention to the expiration of the contract, but no negotiations regarding the drafting of a new contract were undertaken until October. Several meetings were held prior to the expiration of the contract and the provisions of a new contract were agreed upon. These conditions were virtually the same as those negotiated



in the contract with the Mining Department, the main exception being that the Electric Power Department contract continues to expire on October 14 rather than July 1 as is the case with the Mining Department contract. The new contract which was executed is for a three-year period and the provisions include the same wage scale and wage change dates as are provided in the Mining Department contract.

Labor relations during the year continued to be very good with no grievances arising which were carried to arbitration. Several meetings were held prior to the commencement of automatic operation of the McClure Power Plant in which we discussed with the Grievance Committee the disposition of the various employees who would be affected by the change in operating schedule necessitated by the changing to automatic operation of that plant. All matters were settled in a manner which was agreeable to the Grievance Committee and no difficulties were experienced.

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STATISTICAL DATA - 1956

Month	Jan	Feb	Mar	Apr	May	June	July	Aug.	Sept	Oct	Nov	Dec
Precipitation -	0.74	0.20	1.08	2.00	3.56	3.39	4.11	2.78	2.14	0.64	3.19	1.69
Total precipitation at Ishpeming during 1956	- 25.52" (2.127 ft.)											
Average " " " "	- 30.75" (44 year record)											

CARP RIVER PLANT:

Drainage area above intake dam	66.66 sq. miles												
Cubic feet precipitation in 1956	3,952,761,804												
Kilowatt hours generated in 1956	17,592,000												
Cubic feet water utilized in 1956 (90 cu. ft. - 1 kwh)	1,583,280,000												
" " " wasted over intake dam in 1956	53,532,000												
" " " in Carp storage Dec. 20, 1955	337,164,874												
" " " " " Dec. 20, 1956	332,412,360												
" " " taken from Carp storage in 1956	4,752,514												
Total run-off in 1956 (cubic feet)	1,632,059,486												
Run-off per square mile of drainage area (cubic feet)	24,483,341												
Second-feet run-off	0.774												
	<u>1913</u>	<u>1914</u>	<u>1915</u>	<u>1916</u>	<u>1917</u>	<u>1918</u>	<u>1919</u>	<u>1920</u>	<u>1921</u>	<u>1922</u>	<u>1923</u>	<u>1924</u>	<u>1925</u>
Total Precip.	30.11	26.53	38.40	36.83	25.46	31.05	29.50	27.40	30.38	33.67	21.90	22.95	20.71
Sec.-ft. Run-off	1.03	0.67	0.93	1.29	0.70	0.79	0.83	0.73	0.68	1.06	0.59	0.50	0.25
	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>
Total Precip.	35.69	29.86	36.06	32.28	23.14	36.70	31.20	32.72	32.87	27.10	30.23	30.10	35.32
Sec.-ft. Run-off	0.85	0.98	1.11	0.67	1.10	0.83	1.13	1.14	1.00	0.79	0.89	0.86	1.33
	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>
Total Precip.	33.58	30.34	32.20	34.26	32.04	32.77	30.81	26.12	32.88	22.87	37.23	30.64	43.50
Sec.-ft. Run-off	1.47	1.05	0.83	0.84	1.17	0.70	0.81	0.56	0.88	0.44	0.77	1.09	1.54
	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>								
Total Precip.	24.35	35.42	33.77	30.82	25.52								
Sec.-ft. Run-off	0.69	0.85	0.84	0.93	0.77								

McCLURE PLANT:

Drainage area above intake dam	140.52 sq. miles												
Cubic feet precipitation in 1956 (Hoist Plant - 31.71"-2.642')	10,349,963,053												
Kilowatt hours generated in 1956	39,150,000												
Cubic feet water utilized in 1956 (125 cu. ft. - 1 kwh)	4,893,750,000												
" " " wasted over intake dam in 1956	0												
" " " in Hoist storage basin Dec. 20, 1955	1,298,780,969												
" " " " " " Dec. 20, 1956	1,554,892,584												
" " " increase in 1956	256,111,615												
" " " in Silver Lake Dec. 20, 1955	0												
" " " " " " Dec. 20, 1956	91,408,800												
" " " added to Silver Lake in 1956	91,408,800												
Total run-off in 1956 (cubic feet)	5,241,270,415												
Run-off per square mile of drainage area (cubic feet)	37,299,106												
Second-feet run-off	1.180												
	<u>1921</u>	<u>1922</u>	<u>1923</u>	<u>1924</u>	<u>1925</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932</u>	<u>1933</u>
Total Precip.	35.10	42.03	26.60	30.49	24.06	43.95	35.51	43.80	38.75	30.81	37.02	32.54	35.07
Sec.-ft. Run-off	1.02	1.54	0.85	0.92	0.52	1.52	1.80	2.22	1.36	1.45	1.10	1.23	1.30
	<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>
Total Precip.	35.02	29.96	32.16	38.18	40.93	41.22	36.59	38.15	40.20	35.64	37.62	37.94	31.91
Sec.-ft. Run-off	1.16	0.90	1.05	1.19	1.75	1.69	1.47	1.28	1.15	1.43	1.17	1.36	0.86
	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	1957		
Total Precip.	37.27	28.81	43.28	40.65	50.90	29.27	41.56	38.13	35.70	31.71			
Sec.-ft. Run-off	1.22	0.78	1.24	1.37	2.09	0.97	1.33	1.29	1.03	1.18			
Average precipitation at Hoist Plant	- 36.35" (36 year record)												



ELECTRIC POWER DEPARTMENTSTATISTICAL DATA - 1956Energy Delivered to Transmission System  
by CCICo. Generating Facilities

	<u>Kwh Delivered to Lines</u>				<u>Total</u>
	<u>CCICo. Steam</u>	<u>CCICo. Hydro</u>	<u>CCICo. Diesel</u>	<u>UPGCo. Steam</u>	
Jan.	--	6,186,540	88,310	204,913	6,479,763
Feb.	152,055	6,043,630	24,105	872,898	7,092,688
Mar.	--	5,827,232	10,050	1,279,442	7,116,724
Apr.	429,450	6,384,659	455,705	1,085,435	8,355,250
May	4,233,267	7,554,700	1,740,660	1,023,700	14,552,327
June	2,577,755	6,725,775	229,415	2,539,085	12,072,030
July	2,077,000	6,095,120	93,015	--	8,265,135
Aug.	2,735,180	5,320,220	37,510	437,187	8,530,097
Sept.	2,646,485	6,993,355	281,105	3,942,650	13,863,595
Oct.	2,424,983	8,791,015	76,700	2,614,902	13,907,600
Nov.	3,326,925	7,232,225	317,600	3,766,171	14,642,921
Dec.	2,488,208	8,322,925	15,680	1,556,970	12,383,783
Total annual use by UPPCo. of CCICo. energy from UPGCo.				<u>26,284,647</u>	<u>26,284,647</u>
Total energy produced by CCICo. generating facilities	23,091,309	81,477,396	3,369,855	45,608,000	153,546,560

ELECTRIC POWER DEPARTMENT

STATISTICAL DATA - 1956

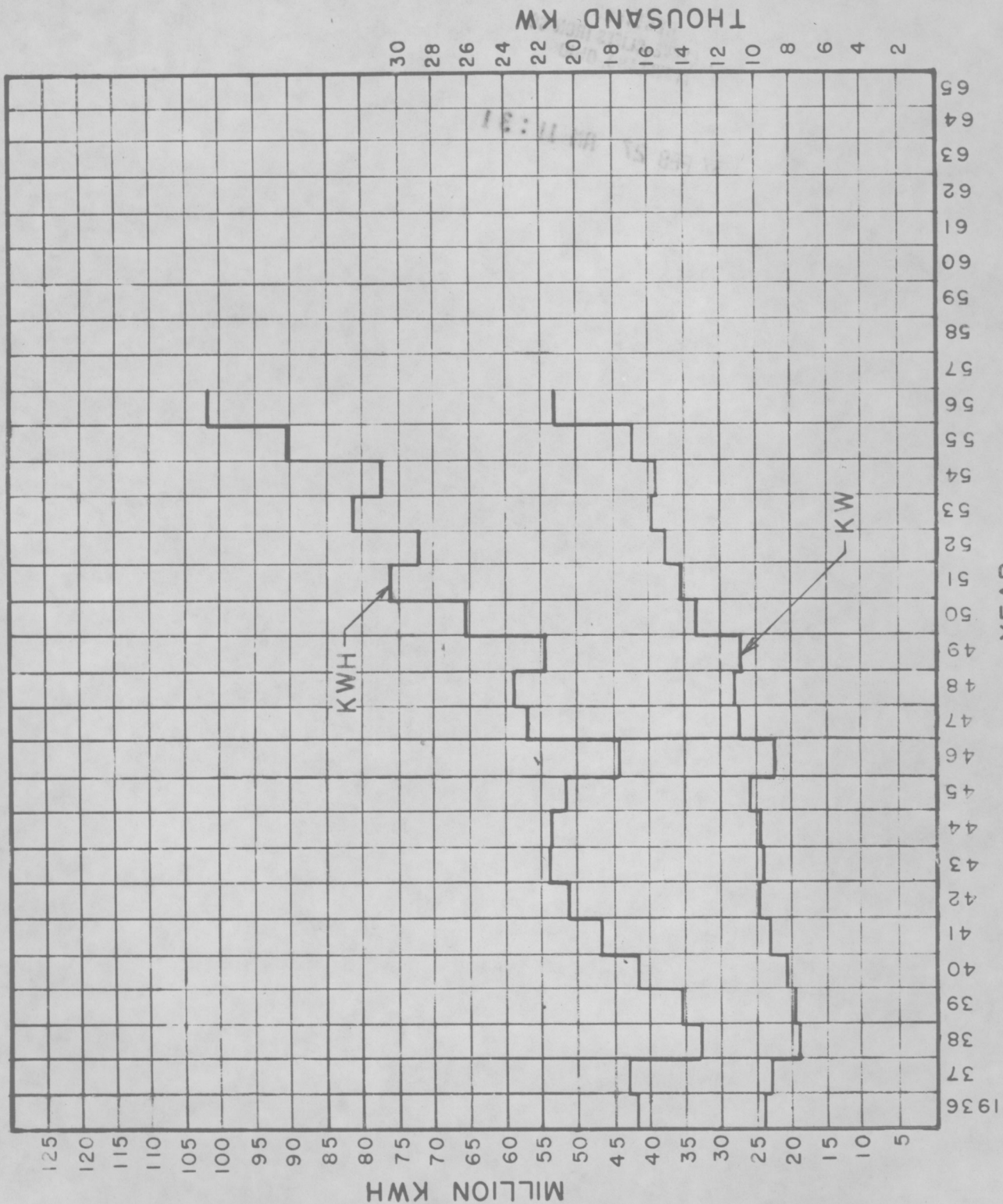
Utilization of Energy Delivered to  
Transmission System by CCICo. Generating Facilities

	<u>Ishpeming Steam</u> <u>Kwh</u>	<u>Hydro</u> <u>Kwh</u>	<u>Diesel</u> <u>Kwh</u>	<u>UPGCo.</u> <u>Kwh</u>	<u>Total Kwh</u>	<u>% of</u> <u>Total</u>
	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>		
The Cleveland-Cliffs Iron Co.	1,248,492	72,631,155	80.0	16,996,811	90,876,458	59.2
Humboldt Mining Co.	218,905	8,142,059	76.2	2,326,542	10,687,506	7.0
Upper Peninsula Power Co.	<u>21,623,912</u>	<u>704,182</u>	<u>1.2</u>	<u>26,284,647*</u>	<u>51,982,596</u>	<u>33.8</u>
Total	23,091,309	81,477,396	53.0	45,608,000	153,546,560	100.0

\*Sold directly to UPGCo. by UPGCo.



ENERGY & POWER REQUIREMENTS  
C.C.I. CO. OPERATIONS \*



\* INCLUDING HUMBOLDT MINING CO.