heat was deoxidized with silicon only, while the fine-grained heat was deoxidized with 1¼ lb of aluminum per ton of steel in addition to a prior silicon addition.

The two steels have been extensively studied in almost all respects that are of interest in the contemplated use of the material, and the results are as follows:

1. The mechanical properties of this material at ordinary temperature are *slightly higher than plain molybdenum* steel.

2. Satisfactory flattening and etch tests of the pipe may be expected.

3. Welding electrodes have been developed that will satisfactorily deposit 0.5% molybdenum containing either of two levels of chromium content—0.35 and 0.5%—with properties similar to the base metal.

4. Satisfactory procedures are available for welding this material under commercial conditions. These involve preheating at 500 F as well as post heating at 1300 F.

5. Bending and upsetting tests indicate this material may be fabricated as readily as other pipe material.

6. The results of residual stress measurement are presented.

7. The material possesses adequate scaling resistance for the contemplated service range of temperature.

8. Hardness and notch-impact tests before and after exposure at elevated temperature indicate that no deleterious embrittlement may be expected during the time that this material is used.

9. No matter how the material was deoxidized, or initially or post treated, *extensive studies failed to show* graphitization when the metal was exposed up to 15,000 hr at 1025 F or 12,000 hr at 1100 F.

10. Creep strength of this grade of steel is comparable to some of the low chromium, low molybdenum steels.

11. In the as-rolled and stress-relieved condition, Heat X11647, to which was added 1.25 lb of aluminum per ton of steel, had the higher creep strength, while in the normalized and stress-relieved condition, Heat X11648, to which no aluminum was added, had the higher creep strength. *Presented at annual meeting, ASME; not available.*

HOW TO OBTAIN COMPLETE TEXT

Material appearing in this month's briefs comes from one of these sources:

American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J., Dec 1-5, 1947. Papers are identified by initials ASME and paper No. Available while supply lasts at American Society of Mechanical Engineers, 29 W 39th St, New York 18, N. Y.

American Institute of Electrical Engineers, midwest meeting, Chicago, Ill. Nov 3-7, 1947. Papers are identified by initials AIEE and paper No. Available while supply lasts at American Institute of Electrical Engineers, 33 W 39th St, New York 18, N. Y.

SYSTEM CAPACITY

Generating Reserve Capacity Determined by the Probability Method, by *Guiseppe Calabrese, Consolidated Edison Co of N. Y.* A fundamental problem in system planning is correct determination of reserve capacity. Too low a value means excessive interruption; too high a value gives excessive costs. The problem is too complex for any rule-of-thumb solutions.

This complexity, on one side, and good engineering and sound economics, on the other, justify analysis methods permitting a systematic evaluation of all *the important factors involved.* Unfortunately no exact method similar to the Ohm's law for circuit problems exists for calculating reserve capacity. The probability theory can be applied *for a systematic attack of the reserve* problem.

Some ten years ago the author's company undertook a study to rationalize its reserve capacity program. From this study evolved a method of "judicious" application of the probability theorem. This paper describes the application of this mathematical theorem. *AIEE Paper No.* 47-248.

Outage Expectancy as a Basis for Generator Reserve, *by Howard P Seelye, Detroit Edison Co.* Three definite conceptions of the purpose of reserve generating capacity apply. They provide for (1) increase in load—particularly unexpected increases (2) outage of equipment for scheduled overhaul (3) forced outage of equipment.

The first of these should be included as a margin in load forecasts. The second is met to some extent by seasonal load variations, which permit sch... maintenance because of the marg... tween load and generating ca... The third follows equipment ... While failure is uncontrollable, o... from this cause can be expecte... follow, in general, averages indicate... past experience.

Since planning for such outages ... ries a heavy element of chance, ... author favors the use of probabilit... mathematics as a consistent, practi... measure of "sizing up" the cha... But he strives for a method and ... mulas for generator outages that ... (1) essentially accurate (2) simple ... use even by one not familiar with ... ability mathematics (3) tangible ... ceptions, easy to grasp, of outages ... in terms of decimals. *AIEE Paper* ... 47-253.

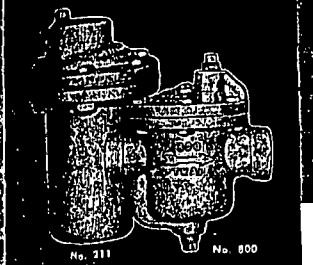
Calculating Probability of Generating Capacity Outages, *by W J Lyman, Duquesne Light Co.* A practical method for evaluating outage possibilities ... valuable for (1) determining pro... reserve capacity (2) analyzing ef... tiveness of interconnections (3) stud... ing effect of additional generating capacity on reserve requirements.

Complex and time-consuming calculations make the use of probability mathematics a limited one. Binomial theorem works well with generating capacity units of equal size. But very few systems have generators all the same.

This paper describes the following approximate methods for (1) a short cut applicable to any number of generating units of different sizes (2) equivalent failure rates for different turbine and boiler layouts (3) a combination for different systems of two or more outage probability curves (4) effect on system-outage probability curve of adding a generating unit (5) approximation with different equipment-failure rates. *AIEE Paper No.* 47-252.

Probability Methods Applied to Generating Capacity Problems of a Combined Hydro and Steam System, *by G. Loane, C W Watchorn, Pennsylvania Water and Power Co.* The methods employed in applying probability to a specific installation are described. They are held to be good for all-steam, all-hydro or combined hydro and steam. As such these methods are valuable.

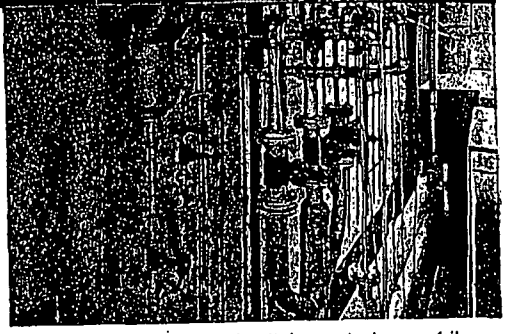
All pertinent factors are reviewed first, followed by a short description of the company's system. Then the major factors affecting the study are reviewed. *AIEE Paper No.* 47-254.



PROOF THAT ARMSTRONG TRAPS PAY DIVIDENDS:

For Fuel Savings and Maximum Production

INSTALL STEAM TRAPS CORRECTLY!



IF STEAM traps are not installed correctly they may fail to do their job — and you lose money.

For fuel savings and maximum production, check your trap installations against the following:

1. **DO YOU HAVE A TRAP ON EACH UNIT?** When you drain more than one unit with a single trap, sluggish heating and low temperatures nearly always result.
2. **ARE YOUR TRAPS LOCATED CORRECTLY?** They should be placed close to and below the unit to provide better drainage and eliminate steam binding.
3. **DO YOU NEED STRAINERS?** If there is sufficient dirt or scale in your lines to interfere with trap operation, Armstrong Y-type strainers should be installed ahead of the traps.
4. **DO YOU HAVE A BYPASS ON CRITICAL UNITS?** Traps should be installed with a bypass. The ARMSTRONG STEAM TRAP BOOK shows the correct methods of installing traps and bypasses. Send for a free copy.

ARMSTRONG MACHINE WORKS
812 Maple Street • Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

ARMSTRONG *Inverted Bucket* STEAM TRAPS

No. 4 of a series of advertisements devoted to improving efficiency through better trapping.