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provided with a single element (water level) feedwater regulator.

Of all the factors enumerated, the most disturbing from the point of view of presenting calculations to determine the available NPSH under transient conditions is the behavior of the feedwater flow during that period of time. *Any assumptions of the results of* a load drop upon the immediate behavior of the feedwater flow are, therefore, somewhat hazardous. It would be desirable, therefore, if not to eliminate the need for these assumptions entirely, at least to postpone them. If, instead of determining the *actual* pressure decay rate in feet per minute for one given flow, we were to express this decay rate in terms of the volume pumped for the entire range of pump flows, we would be in the position to compare this rate with the allowable decay rate similarly expressed and establish the maximum flow for any given load drop below which the *allowable* rate exceeds the *actual* and below which the installation is always safe.

This process is, of course, simple for the *allowable decay rate. In effect, if* we divide dP/dt (*allowable* rate of decay in feet per minute) by dq/dt (pump flow in gallons per minute) we obtain a value of dP/dq which represents the *allowable* pressure decay in feet per gallon pumped. The results of these *calculations* for the *installation* described are shown graphically.

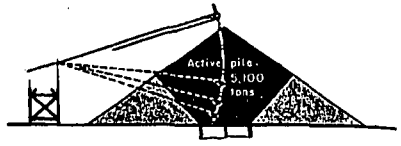
The authors then carry on in this manner to discuss other problems for open cycle and closed cycle feedwater operation as well. *ASME Paper, No. 53-F-32.*

TO OBTAIN COMPLETE TEXT

Material for these abstracts comes from the following sources unless otherwise stated. Order complete paper from sources, not POWER.

American Society of Mechanical Engineers, fall meeting, Oct 5-7, Sheraton Hotel, Rochester, N. Y. Identified by initials ASME and obtainable through ASME, 29 W 39th St, New York 18, N. Y.

Association of Iron and Steel Engineers, annual convention, Sept 28-30, William Penn Hotel, Pittsburgh, Pa. Identified by initials AISE and available from T J Ess, secy, AISE, Empire Bldg, Pittsburgh, Pa.



YARD COAL STORAGE consists of inactive and active volumes. Shaded portion of diagram shows inactive volume of 16,000 tons

Improved Controls Reduce Coal Handling Costs

Coal Handling Facilities with Automatic Remote Control Features.
By H C Schweikart, Gilbert Assoc.

Coal handling facilities ranging in cost from $5.00 to $20.00 per installed kw and averaging about 7% of the total power plant cost have not made their fair share of progress in reduction in cost of equipment and operating labor, improved load factor and extension of automatic operation.

During the past decade the capacities, pressures, temperatures and efficiencies of individual turbine generators, steam generators and associated auxiliaries have increased considerably, resulting in lower savings of installation and maintenance costs per kw and requiring fewer operators. This progress has been *accomplished by fundamental changes* in design but aided to a considerable extent by more and better controls, primarily automatic or at least remote manual. By contrast in general, as the larger units required greater quantities of coal, the capacities of the bunkers, belt conveyors, crushers, feeders, etc have merely been correspondingly increased with the usual intermittent, manually supervised operation confined to approximately 40 hours each week.

This paper describes the coal handling facilities being designed for the Milliken Station and incorporating some automatic features that are expected to result in lower installation and operating *costs.*

Bunker capacity was given careful consideration. With a conventional coal conveying *system involving trippers etc,* bunkers of two different capacities were considered. The smaller bunker with a width of 55 ft and 22 ft depth had a capacity of 1400 tons equivalent to 28 hours on a maximum burning rate basis. To obtain a bunker capacity of 2000 tons equivalent to 40 hours of maximum burning rate by increasing the height alone (20 ft) would increase the cost by $83,200. If the increased bunker capacity were obtained by adding to both the height (10 ft) and width (19 ft), the cost would increase by $74,100. Thus the incremental cost of the bunker is in the order of $131 per ton of coal stored. These costs include conveyors, bunker steel, building and foundations.

The final plans actually provide for a steel bunker having a capacity of only 700 tons which is sufficient to operate the steam generator for 14 hours at the maximum rating of 1,000,000 lb of steam per hour when the fuel burning rate will be 50 tons per hour. The bunker capacity might have been even smaller without undue jeopardy to continuity of coal supply perhaps in the order of 400 tons or 8 hours at maximum steam generator rating. The actual capacity decided upon was based on *building volume resulting from* establishing the height by extending the roof above the bunker at the same elevation as the turbine room roof, establishing the length and width by the space required by the pulverizing equipment.

It is our considered judgment that the 700 ton bunker incorporated in the continuous automatic reclaim scheme provides more active storage than the 2000 ton bunker incorporated in a conventional coal handling installation. A 2000 ton bunker is somewhat on the conservative side since our own organization now has 4000 ton bunkers under construction on similar size units for a different client.

All coal delivered to the station is first conveyed to storage. This portion of the facilities is operated manually on an intermittent schedule. The yard storage consists of an inactive volume of some 500,000 tons and an active volume of 5100 tons supported over four reclaim hoppers each incorporating 300-tph remote controlled feeders. Each pair of feeders deliver coal to 300-tph crushers.

The coal leaving each crusher can be discharged to either one of two 300-

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