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# KEUUKU CENTER FAL



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C. N. Gross, Manager Monaincturing Department IIAIFORD VORKS

# 100 AREAS WATER TREATMENT SPECIFICATIONS

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A review of the data from tests using alum in the treatment of pile process water, and using activated silica as a coagulant aid during period of low water temperature, shows that this method should be substituted for the present nothed of treating pile process water in all 100 Areas. It is recommended that the unter treatment procedures and specifications attuched to this memorandum be initiated as standard practice in all 100 Areas as soon as it is possible to make the necessary equipment modifications and installations.

#### Dincussion

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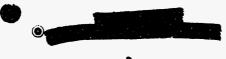
The test to evaluate the effectiveness of treating water with alum and activated silics has produced data which show that this method of water treatment gives a superior type water for pile process use and substantially increases filter plant copacities. The following brief review of the data available on filtration rates, slug corresion rates, film formation, and effluent activity demonstrates the advantages of this process.

Oporntion of the F Water Plant has shown that filtration rates may be considerably increased when the alus-activated silics process is used. Process water of the proper quality has been obtained on a continuous basis with flow rates of 4.45 gpm/sq. ft. of filter area as compared with maximum filtering rates of about 2.95 gpm/sq. ft. with ferric sulfate treatment. Continuous rates as high as 5.2 gpm/sq. ft. have been maintained with new type filter media. This increase in filtering capacity will furnish more water as required for increased production without further expanditures to increase filter plant capacity; this effect is importance in the 100-C and 100-H Areas.

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Tests indicate that slug corrosion rates are less with alum treated water than with ferric sulfate treated water. Data obtained from two tubes exposed for six weeks to alum treated water without dichromate above a corrosion rate for this period of time which is about seventy-five per cent of the corrosion rate observed with ferric sulfate treated water without dichromate during a six month period. Since the corrosion rate of aluminum in ferric sulfate treated water without dichromate decreases with continued exposure, it is anticipated that this same phenomenon will be observed with alum treated water, and that the recommended water treatment method will give substantially lower slug corrosion rates at full exposure than are obtained with the present water treatment method. Those forecasts are influenced by additional in-pile data obtained from alum treated water with dichromate and by data obtained in the flow laboratory; these data will be reported in detail in a forthcoming document.

Data from the full pile production test at I Area show that with exercil control of the proposed water treatment method, pile process tube film formation rates are negligible. The absence of film in process tubes will effect small increases in production rates from the piles, unless a practice were to be adopted of purging the piles very frequently at full power level. With proper control of the vater treatment process, purging can be eliminated, which, in turn, will give a small operational cost saving and will mullify the possibility of cross-header screen plugging which has caused outage time in the part.

It has been found that the rear face activity during shutdown at F Area has been decreased by about ninety per cent with alum treated water as a result of eliminating film and purge particles which are normally trapped in the rear face piping. Data reported by the Radiological Sciences Department and by the Radiation Homitoring Unit of the Reservor Section indicate that the recommended vater treatment has no major effect on the radioactivity of the effluent water from the retention basin.

Estimates on treating costs show that the proposed method is no more costly than the present process if dry congulant is used and may be considerably less costly if liquid alum is used.

Since it is advantageous to institute this new process water treatment in all 100 Areas as soon as possible, the attached specifications are presented to serve until such time as complete specifications may be issued.

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## IPTERIN 100 AREAS PROCESS WATER SPECIFICATIONS

The 100 Aress process water treatment specifications are as follows:

#### 1. Chlorination

Chlorine, by the same methods as ere currently being used, may be added as required for slims and algae commol or to increase congulation officiency in the 182 New Water Reservoirs or in the 183 Head Houses. Chlorine shall be added in assumts so that the residual does not exceed the limits given below.

### 2. Congulation

The rew river water will be treated with sufficient commercial grade aluminum sulfate to produce the quality of water specified below. The aluminum sulfate may be either in the dry crystalline form (Chamical No. 103, E1-19156) or a liquid form of similar quality.

Activated silica may be added as a congulation aid. The activated silica will be prepared by the Baylis process, or minor variation thereof, and neutralization of the sodium silicate (Chemical No. 113, HW-19156) will be accomplished by the addition of sulfuris acid (Chemical No. 20, HW-19156). Firm specifications for the conditions of use of activated silica will be submitted at a later date, based upon results of continued test work at 100-F.

#### 3. Lim Midition

Commercial grade hydrated calcium oxide, or lime, (Chemical No. 108, EN-19156) will be added for pH control. Since the congulation process should be carried out at a pH below 7.5, the lime will be added after the congulation and filtration processes have been completed. Sufficient lime will be added to maintain the process water pH within the limits given below.

# 4. Chemical Additives

No additions of chemicals other than those specified are to be made.

### 5. Weter Quality Limits

The veter delivered to the 105 Piles will be maintained within the limits 0 given below.

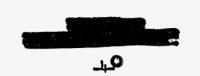
#### A. Chlorine and Chloride Maximum Concentrations in ppm.

Total Calorides	Hornel Broad	5.0 5.0
Free Chlorine	Normal Broad	0.2



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C. N. Gross

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B.	Pro	cosn Water	Max imum	Impurity	Concer	tration:	in ppm.		(0)
0	1.	Iron	0		•	Normal Broad		0.005	
	5.	Aluminum				Normal Broad		0.05	
	3.	Turbidity				Normal, Broad	<b>(A)</b>	0.2	
° æ.	Eg	of Water.O	)	0	(	<b>Ö</b>	(		<b>(</b>
	þi	Distribution .				Normal Broad	<b>(D)</b>	7.6 - 7.5	7.7 7.8
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## 6. Transition Limits

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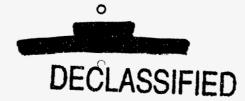
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Following the changeover in water treatment process from ferric sulfate to alum, it is expected that iron and other concentrations will run higher than normal until the process water system has been thoroughly flushed. Thus, for a period of 120 days from the date of process change, any pile may operate within the Broad Limits of water quality without approval from the Process Committee. After this period, Process Committee approval is required to operate on an emergency basis outside of the Normal Limits, but within the Broad Limits, for any pariod greater than twenty-four hours. Planned operation outside of the Normal Limits must be approved by regular production test procedures.



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