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Design engineer decisions tree: paper mill boiler feedwater

Scope

If the power and recovery boilers are the heart of a modern paper mill, then the boiler feedwater must be considered the lifeblood of the operation. The design of a greenfield paper mill, or new construction within an existing mill, requires many important decisions to ensure economy and reliability in the steam generation area. This paper discusses the pertinent design questions associated with paper mill boiler feedwater.

Safety precautions

Boiler feedwater, steam, and condensate are handled at high pressure and temperature. Some chemicals used in water treating are hazardous. Detailed system design and operation of water treating systems are outside the scope of this paper. Readers are cautioned, however, that designers and operators of these systems must understand the hazards and exercise caution to avoid injury.

Introduction

Due to the complexity of paper mills, extensive design-stage planning is needed to minimize start-up problems and to ensure smooth long-term operations. The interactive nature of paper mill water systems is one of the prime contributors to this complexity. Many decisions must be made when planning a boiler feedwater system for an integrated paper mill (see Figures 1 and 2). This paper will present the various options available at each decision point and will make some recommendations. The path through the decision-making process follows the feedwater as it progresses toward the boiler steam drum.

Early in the planning stages of any greenfield project (and with any mill expansion project), certain basic data are

gathered. This basic information usually includes:

- expected boiler pressure
- mill product mix
- available raw water sources

Other information might also be needed, such as planned power generation and intake/discharge permit conditions.

An overview is helpful at this point to better relate the various water systems in an integrated paper mill. Figures 1 and

2 are schematics of the complex water systems present in a paper mill. Raw water can be the source of water to meet

process and cooling water demands. However, some paper processes require that pretreatment be performed on the

raw water before the required water quality can be met. Preparation of boiler feedwater, as such, begins with the external treatment step.

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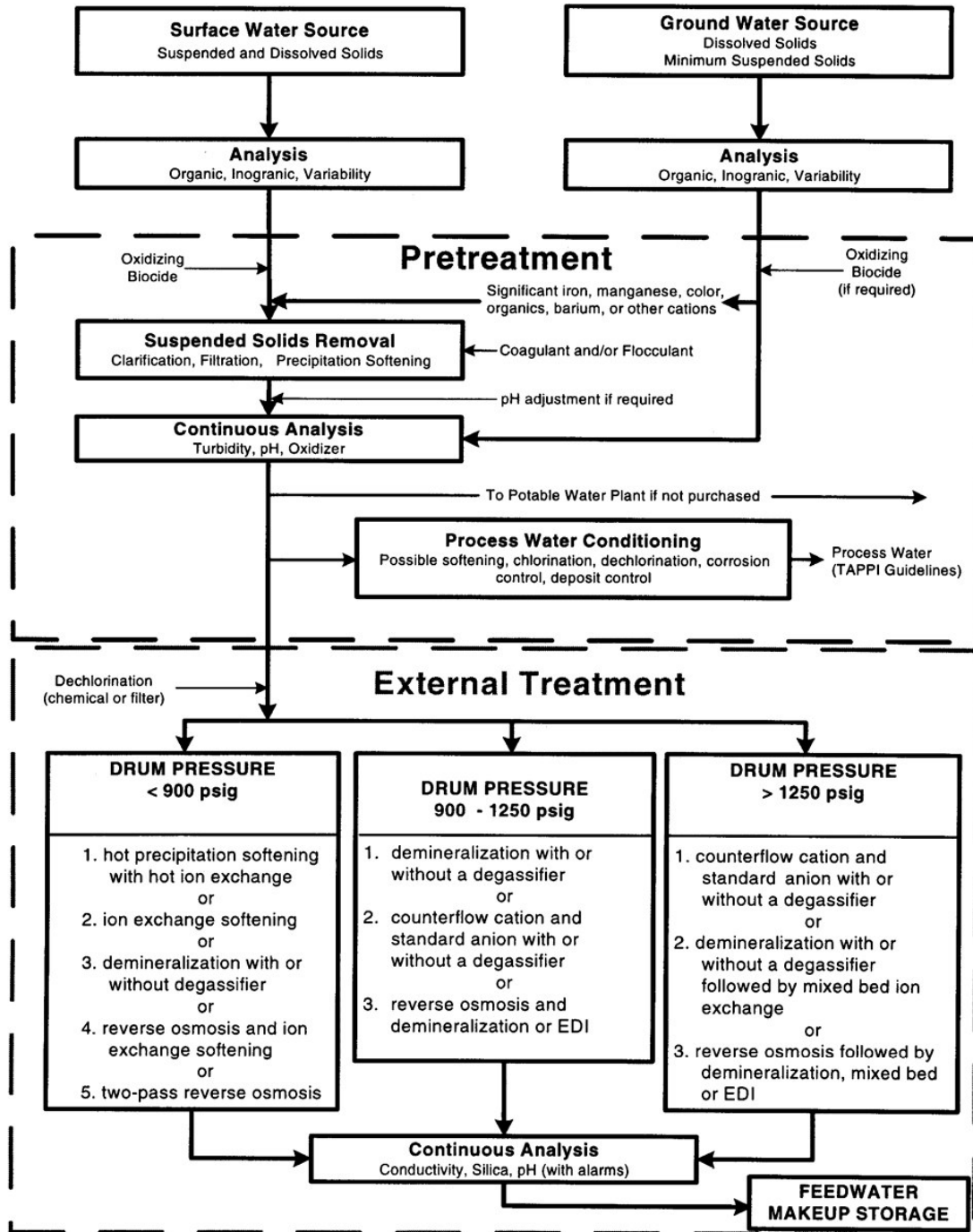


Fig. 1. Pretreatment and external treatment

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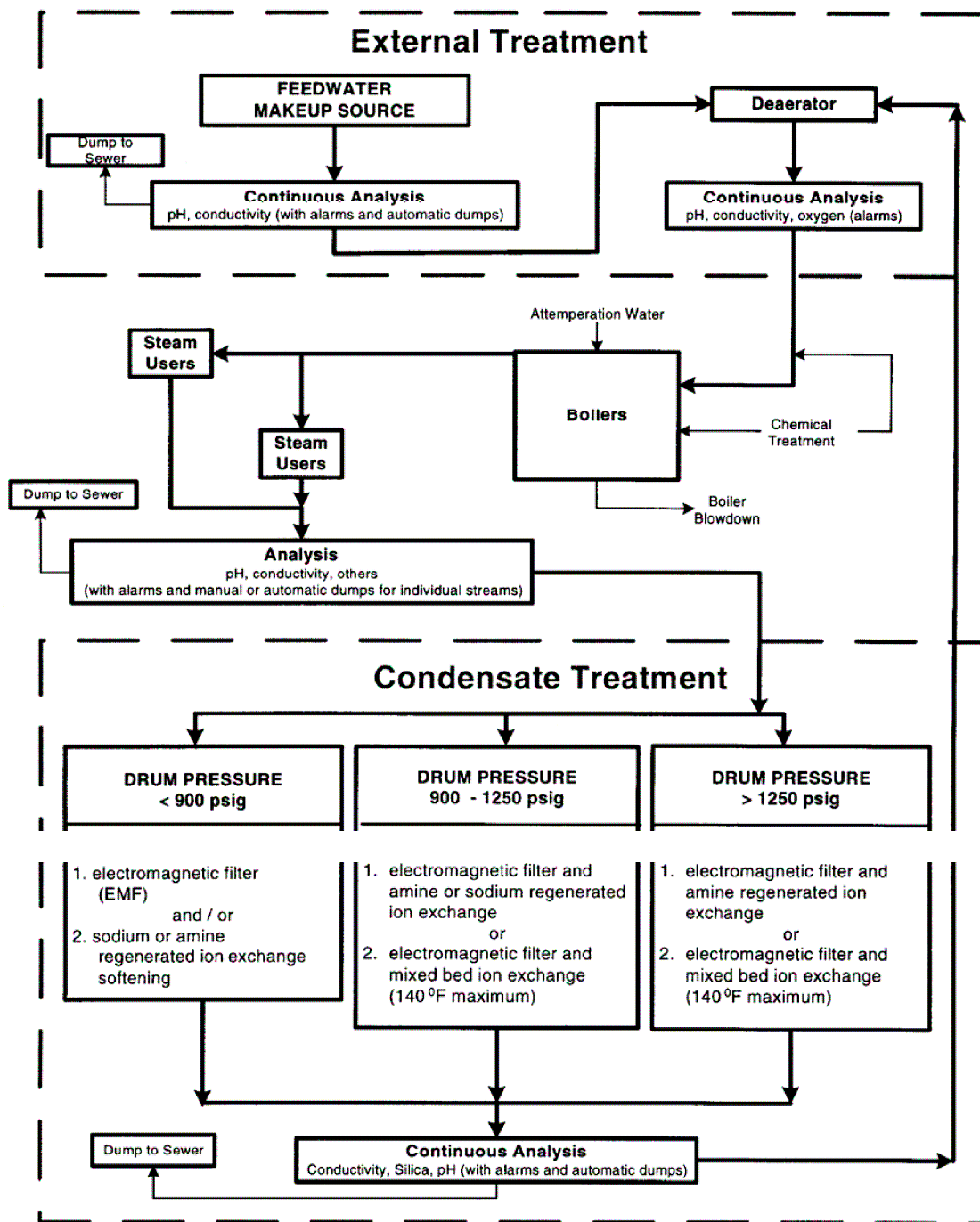


Fig. 2. Condensate treatment