ELECRIC & INSTRUMENTATION SYSTEM FOR OTA RIVER REGIONAL SEWERAGE EASTERN DISTRICT PURIFICATION CENTER, HIROSHIMA PREFECTORE

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1. FOREWORD

Common use of the Ota River watershed sewage eastern district purification center started in October 1988 as the third watershed sewage treatment plant in Hiroshima Prefecture.

Hiroshima Bay is famous for its oyster cultivation. But since it is a closed sea area, it has severe drainage regulations from the standpoint of maintaining water quality. These points were also taken into account with the electric instrumentation. This system is introduced below.

2. OUTLINE OF FACILITY

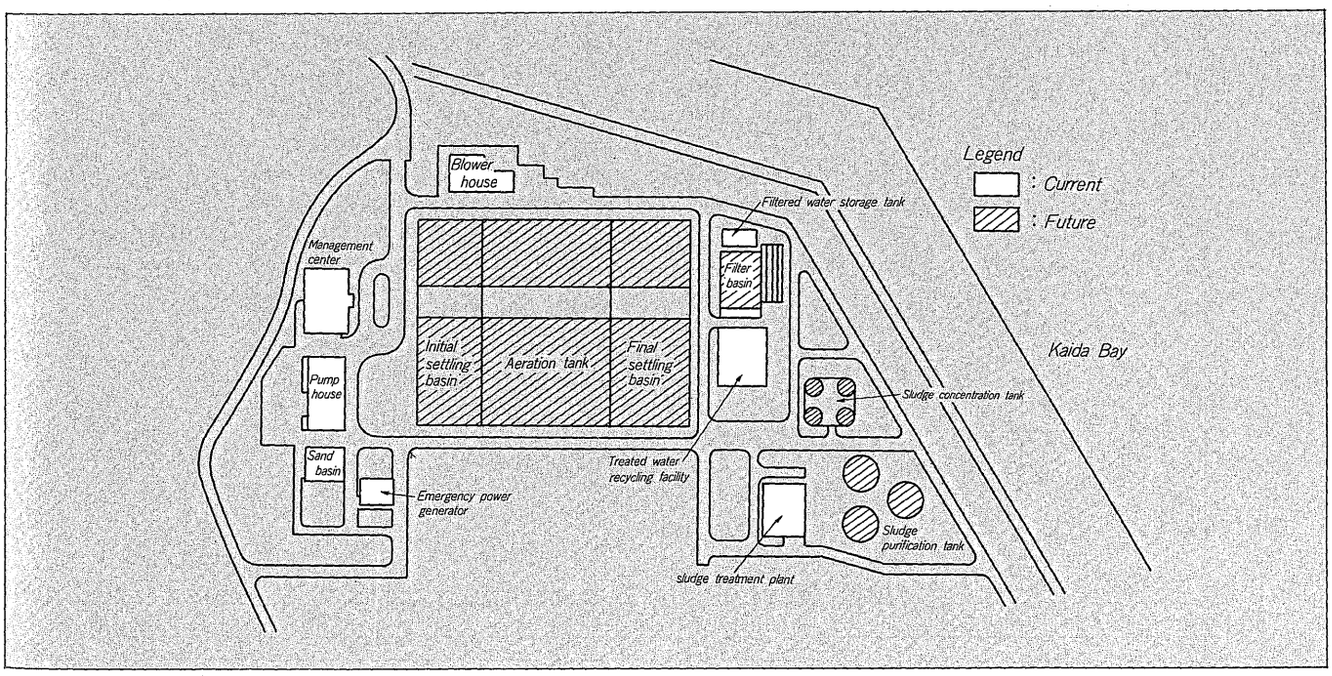
The Eastern District Purification Center facilities are outlined in *Table 1.*

The Eastern District Purification Center is build on Kaida Bay reclaimed land. Approximately 1/16 of the entire facility is current operating. The processing amount

Table 1 Outline of facility

Item	Overall plan (14 systems)	Use start time
Planned processing area	1,808ha	342ha
Planned processing population	180,570 persons	7,500 persons
Planned processing capacity	98,400m³/d	3,000m³/d
Processing method	Standard activated sludge method	
Sand basin	2	1
Waste water pump	4	2
Initial settling, aeration, final settling basin	24	6
Rapid filter basin	5	2
Blower	6	3

Fig. 1 Center layout



is forecast to increase sharply with the installation of sewer pipes in the future. Water treatment was followed by the start of operation of the sludge treatment facility in December 1988.

3. SYSTEM COMPOSITION AND FUNCTIONS

The system block diagram of the electric instrumentation facility is shown in *Fig. 2.*

3.1 Receiving and distributing power facility

The distributing systems receives one 6.6kV circuit from the Chubu Power Co. and sends power to the electric room of the management center, pump house, blower house, and treated water recycling facility at a high voltage. At the electric room, the voltage is dropped to 420V by a transformer and is supplied to each power facility. A 750kVA emergency generator is installed as a power interruption countermeasure. Installation of a special high voltage receiving facility at load expansion is planned for the future. A simple wiring diagram is shown in *Fig. 3.*

3.2 Supervisory control facility

Reliability, safety, and expandability are taken in account and the supervisory control system uses a distributed control system. A data logger and mini graphic supervision and operation panel are installed at the center. The center is connected to the sequence controller of each electric power by a dataway.

The data logger is the center of the man-machine interface. Process details supervision and operation and various data setting are performed by two CRT displays. A kanji printer automatically generates daily, monthly, and annual and operation and alarm record reports.

The entire facility can be grasped and operation and setting of various devices can be performed at the mini graphic panel.

A sequence controller is installed in each electric room and are assigned an automatic-linked circuit. DDC is performed by single loop controller. Setting can be changed easily at the site.

3.3 Sludge treatment plant supervisory control facility

Since sludge treatment is managed separately from water treatment, a special data logger and mini graphic panel are installed in the sludge treatment plant. However, the main data is transmitted to the water treatment center via a dataway and is formed to perform overall management.

4. SYSTEM FEATURES

(1) Completion of man-machine interface

Two CRT displays are installed as the center of the man-machine interface. These two units are independent so simultaneous detailed supervision of plants is possible. Operability is also improved by making it possible to set the various data used in automatic control by both water amount and percentage. This switches to the suitable control method at the center when the in-flow changed. Correspondence to water quality can be realized. A trend screen and contract demand supervision screen are also

Fig. 2 System block diagram

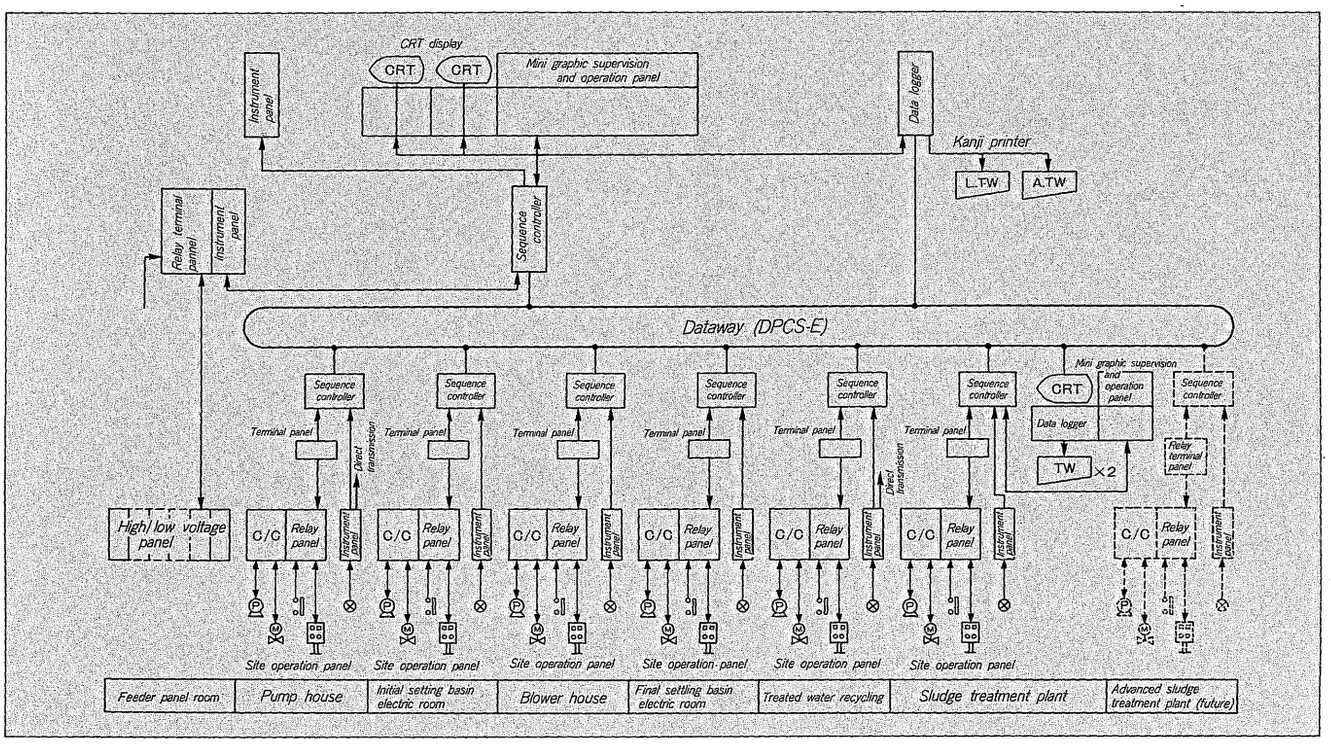
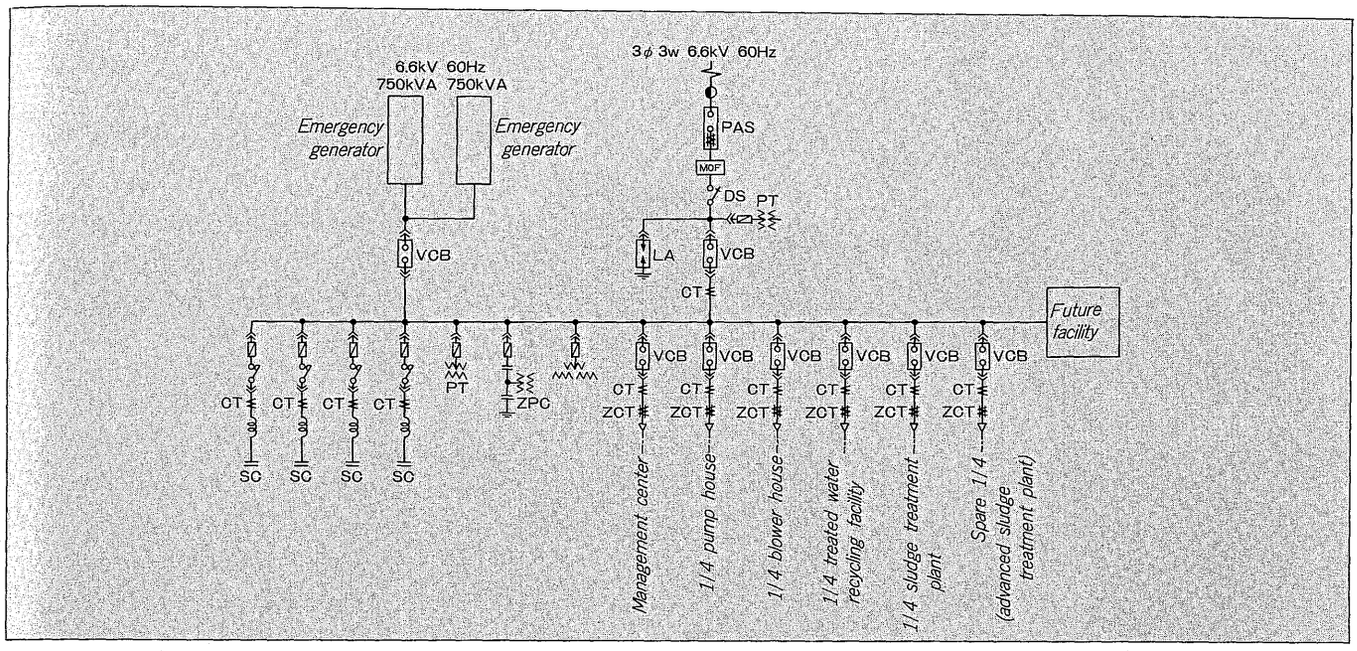


Fig. 3 Simple wiring diagram



provided. The aim was a man-machine system which lightens the operator load.

The mini graphic supervision and operation panel has the minimum functions which can operate the plant even when trouble occurs at the data logger. To process the expanded number of supervision and operation plants at the overall plan, a switching system has been introduced for operation and setting of devices used at a comparatively low frequency and the devices have been made more compact.

(2) Separation of water treatment and sludge treatment functions

Since the sludge treatment facility has a different processing mode than water treatment, the function of the supervisory and control facility is also distributed and a dedicated sludge treatment data logger and mini graphic supervision and operation panel are installed. This allows detailed operation supervision independently from water treatment even when the sludge generation amount has increased. However, the main data are sent to the data logger of the water treatment center via a dataway so that overall management of water revenues and expanses is performed.

(3) Expandability

Expansion work on this facility will continue in the future, but consideration is given so that operation is not obstructed at expansion.

The sequence controllers can be expanded in card units and unit units. The time required for system modification is also small. The mini graphic supervision and operation panel has a built-in controller remote I/O unit. Multi-conductor cable does not have to be run even at expansion. The main measurement items are recorded on a recorder. The water treatment conditions can be grasped even at data logger remodeling.

5. CONCLUSION

The distributed control system has numerous records in the world. We are confident that the Eastern District Water Purification Center electric instrumentation system realizes detailed management and meets the needs of the operator.