

ANNEX 16

COMPARATIVE STUDY OF ALTERNATIVES

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1 Concept of Future Water Supply Facility Planning

The purpose of the study is to prepare a master plan and to conduct a feasibility study on the priority project which will be drawn from the results of the master plan to meet future water demand.

However, during the Phase 1 Study: Reconnaissance Survey, some problems were found in the existing water supply system. The study team considered that it is indispensable to restore the existing system to be able to function efficiently before the system expansion.

Among existing problems the NPVC is facing, significant problems are identified as follows, besides the shortage of production capacity to meet water demand.

- Deterioration of the Kaolieo Treatment Plant
- Lack of distribution facilities in the Chinaimo Treatment Plant even though a certain amount of water is directly distributed from the plant

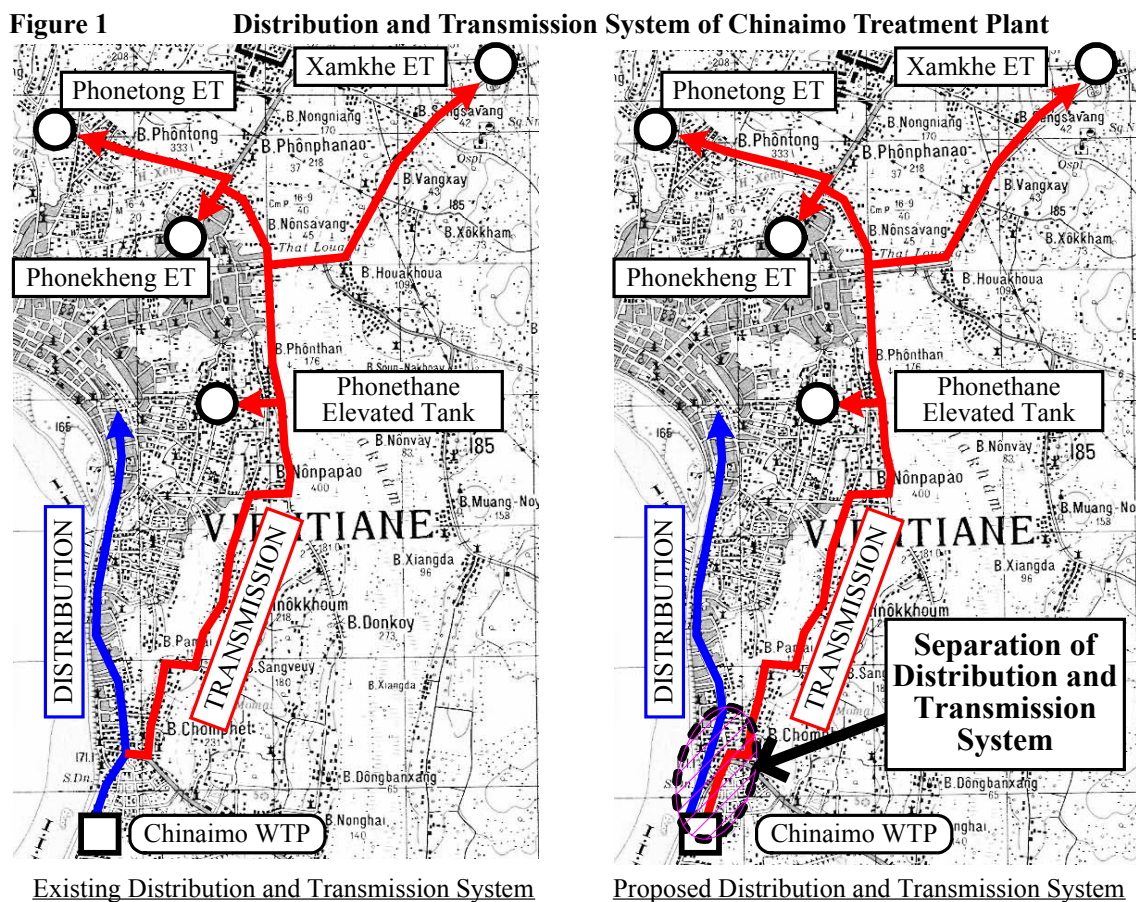
The Kaolieo Treatment Plant, which has a capacity of 20,000 m³/day, was originally constructed in 1963, with rehabilitation works implemented in 1983. 20 years has past since the last refurbishment and not only structural deterioration, but also electro-mechanical equipment malfunction or deterioration was found on inspection. Conditions of the existing Kaolieo Treatment plant are detailed in Chapter 3. In order to secure water supply to the existing service area from the Kaolieo Treatment Plant under such situations, the study team consider that rehabilitation work for the Kaolieo Treatment Plant is indispensable. Furthermore, the pipeline expansion from the Kaolieo Treatment Plant is an on-going project using the financial support of the AFD, hence, production at the Kaolieo Treatment Plant should be secured future decades.

The Chinaimo Treatment Plant was originally designed for water to be transmitted to elevated tanks and reservoirs throughout the town. Therefore, the total capacity of the pumps in the Chinaimo Treatment Plant is 80,000 m³/day, the same as the plant capacity. This means that the plant is not able to distribute water which has hourly fluctuations. Accordingly, the capacity of reservoirs is about 3,000 m³, equivalent to less than 1 hour of plant production capacity.

Although the plant was designed only for transmitting water to the elevated tanks and reservoirs, distribution lines are branched from the transmission pipeline to distribute water directly to the town. The amount of the distribution is about 50 % of treated water, 40,000 m³/day. Because of the mixture of distribution systems and transmission systems at the Chinaimo Treatment Plant, the

distribution system can not meet hourly fluctuations and the transmission system becomes unstable, depending on the quantity of distributed water, as pointed out in the previous chapter.

Given these conditions, it is considered that the separation of the systems is indispensable to achieve a stable distribution and transmission system of delivering water. Figure 1 shows the present and proposed distribution and transmission systems of the Chinaimo Treatment Plant. For this separation, expansion of reservoir capacity (a new reservoir adjacent to existing one), the installation of distribution pumps to meet hourly fluctuations of the demand, and the installation of an independent transmission main line from the plant to the branch point of existing transmission pipelines are required. For the transmission system, existing pumps will be utilized.



The capacity of the new additional reservoir will be 10,000 m³, equivalent to 6 hours of 50% of the plant capacity, 40,000 m³/day. Since the effective depth of the existing reservoir and pump suction pit are rather shallow, 2.7 m, the new reservoir will occupy a large space in the plant if the system is designed to the same hydraulic conditions. Therefore, the new reservoir and additional distribution pumping systems are planned to have separate hydraulic conditions to save land space.

A comparison of the reservoir spaces that are required in the case of which has the same hydraulic conditions and of which has separated hydraulic conditions is shown in Figure 2.

As discussed above, facility planning will put the first priority on the following works to restore the existing system to the condition that it should be in, and then the system expansion will be considered.

- Rehabilitation of the existing Kaolieo Treatment Plant
- Separation of distribution and transmission system at the existing Chinaimo Treatment Plant

Figure 2 Comparison of Proposed Reservoir Size at Chinaimo Treatment Plant

