To the Editor:

In "Unified Conceptual Approach to Targeting and Design of Water and Hydrogen Networks"[1] (pp. 1071–1082), the authors presented a methodology for targeting and designing water and hydrogen networks. This is an excellent work that the proposed approach can be applied to reuse, regeneration reuse, regeneration recycle problems for water networks, and reuse and regeneration problems for hydrogen networks.

However, with respect to the targeting of water regeneration networks, the authors have overlooked some special cases that have been observed by Mann and Liu.[2] Unfortunately, these special cases can further reduce the freshwater flow rate for the regeneration reuse case of Example 1.

After Eqs. 2, 8, 9 had been solved for case 1 ($F_{ws} = F_{reg}$, $C_{in} = C_p$) of Example 1, the authors drew the composite water supply line as shown in Figure 1. which is infeasible above the pinch. However, Eq. 8, which implies the limiting composite curve and the composite water supply line touch at the pinch point, is not a necessary condition for freshwater minimization of this case. If the two composite curves touch at point A as labeled in Figure 2, Eq. 8 would be changed to

$$F_{ws}(C_p - C_w) + F_{reg}(C_A - C_o) = m_A \quad (*)$$

Solving Eqs. 2, $*$ and 9, the results are: $F_{ws} = F_{reg} = 39.47$ t/h, $F_{ww} = 19.47$ t/h, $C_{ww} = 250$ ppm. The corresponding composite water supply line is also shown in Figure 2. Thus, case 1 becomes possible, and its freshwater flow rate is smaller than the 45 t/h obtained in the partial regeneration case.

Moreover, according to Mann and Liu,[2] the freshwater flow rate can be further reduced by increasing the regeneration concentration C_{in}. As shown in Figure 3, when C_{in} is increased to 170 ppm, the composite water supply line just touches the limiting composite curve at the pinch point. The corresponding results are $F_w = F_{reg} = 37.5$ t/h, F_{ww}=17.5 t/h, $C_{ww} = 250$ ppm.

Notwithstanding, it should be noted that Mann and Liu[2] did not apply the regeneration case to a system with water losses or gains. Therefore, this extension would be made here to supplement the work of Mann and Liu.[2]

To illustrate the targeting approach, the total regeneration case ($F_{ws} = F_{reg}$, $C_{in} > C_p$) of Example 1 is revisited. For this case of regeneration, the targeting composite water supply line is already shown in Figure 3. Now, consider Example 1 introducing the water loss of 10 t/h at 50 ppm. This loss is shown in Figure 4a as an increase in slope of the composite water supply line at 50 ppm. The flow rate loss dictates the change in slope. The target is infeasible. Figure 4b shows the required increase in flow rate to attain feasibility. The target is now 41.07 t/h of freshwater. It should be pointed out that the above procedure is iterative, as it involves the use of multistep graphical approach. On the other hand, this extension is also possible with the noniterative approach developed by Agrawal and Shenoy,[1] as it considers the effect of water loss when constructing the limiting composite curve.

In summary, we suggest that the method of Mann and Liu[2] should supplement the article to provide a full solution for the problem. On the other hand, it should also be recognized that the method that developed by Agrawal and Shenoy[1] is simpler than the method of Mann and Liu[2] when dealing with the water losses or gains problems.

Literature Cited

1. Agrawal V, Shenoy U. Unified conceptual approach to targeting and design of water and hydrogen networks. *AICHE J*. 2006;52 (3):1071–1082.
2. Mann JG, Liu YA. *Industrial water reuse and wastewater minimization*. McGraw-Hill Companies, Inc.; 1999.

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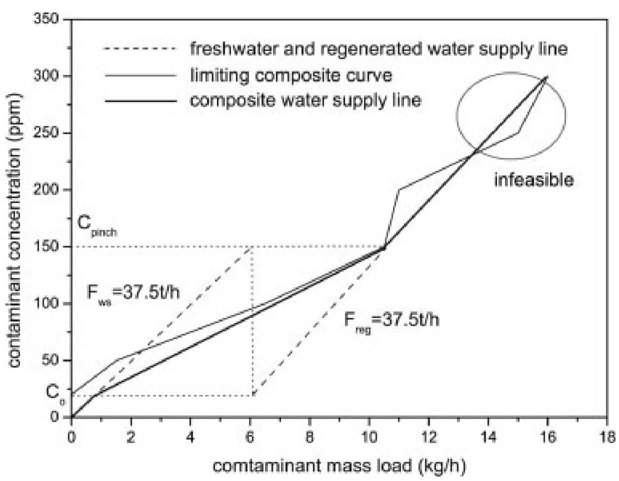

Figure 1. Targeting for Example 1 with the total regeneration ($F_{reg} = F_{ws}$, $C_{in} = C_p$) by Agrawal and Shenoy.[1]

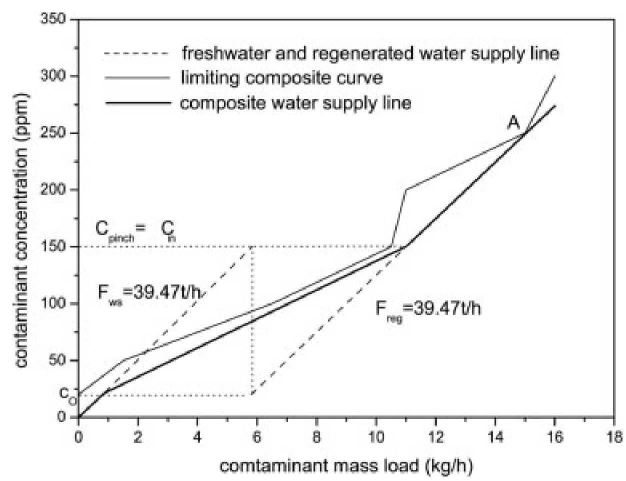

Figure 2. Another choice for Example 1 with total regeneration ($F_{reg} = F_{ws}$, $= C_{in} = C_p$).

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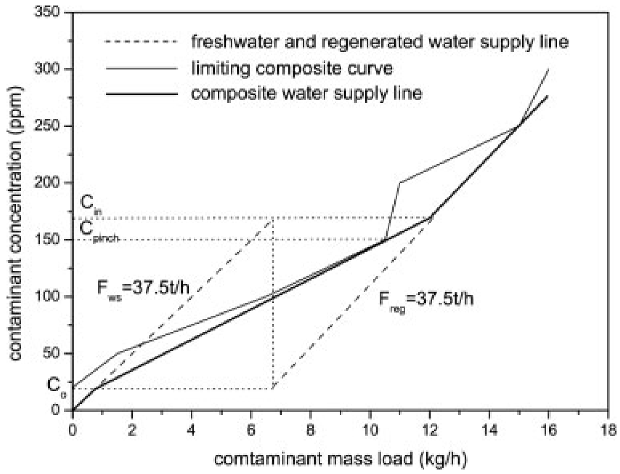
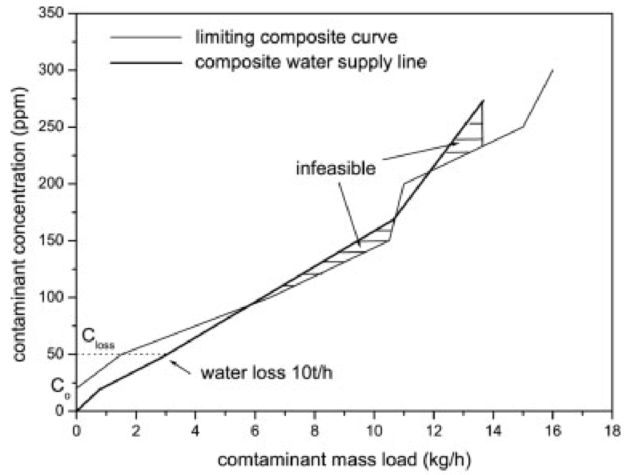
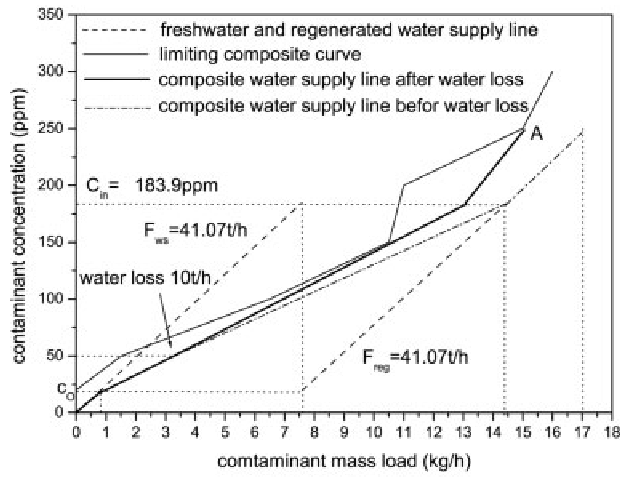


Figure 3. Targeting for Example 1 with total regeneration where $F_{reg} = F_{ws}$, $C_{in} > C_p$.



(a)



(b)

Figure 4. Targeting for the total regeneration case ($F_{reg} = F_{ws}$, $C_{in} > C_p$) of Example 1 with a water loss.

(a) Introduction of a water loss of 10t/h at 50 ppm makes the target infeasible, and (b) increasing the flow rate of freshwater makes the target feasible.