

### **13.3 Simulation Results with Countermeasures along Wadi Suq**

#### **13.3.1 Complete Cutoff at KM 14**

The simulation was repeated but with an effective cut-off trench at KM14. We assumed that no contamination would pass through this location. This assumption requires careful trench construction at KM 14 and future monitoring to ensure that the trench is acting as designed.

The estimated chloride concentrations along the entire wadi are shown on Figures 13.9, 13.10, and 13.11 for 10 years, 20 years, and 30 years after trench construction (trench construction is assumed to take place by 2002). It is shown that significant clean up occurred downstream of KM 14 due to the combined beneficial effects of rain infiltration and mixing of relatively clean water from the tributaries with the contaminated water along Wadi Suq. The effect of the construction of the trench at KM-14 can be further illustrated by plotting the concentration of chloride at the locations shown on Figure 7.7 with time. At location 1 located downstream of KM-14, the clean up is very dramatic with the chloride concentration returning to below 600 mg/L within 30 years. At location Trench-2, the reduction in chloride concentration is also very clear. At Falaj al Qabail, there is an increase in the chloride concentration from 150 mg/L to about 325 mg/L after 30 years. However, the concentration at this location is well below that shown on Figure 7.13.

The concentration of chloride at the trench itself as a function of time after trench construction is shown on Figure 13.12. As shown, the concentration of chloride is almost steady ranging from 5,400 to 5,800 mg/L. The concentration of Chloride just downstream of Trench -2 is shown on Figure 13.13 to increase from about 13,000 mg/L to 18,500 mg/L before it stabilizes at about 18,000 mg/L. These two figures indicate that the construction of the cut-off trench at KM 14 will have limited impact on the chloride concentration upstream of KM14. Therefore, the clean up of the main branch of Wadi Suq upstream of KM 14 will require further remedial measures at Trench No. 2 to make this trench more effective.

We have evaluated the effect of additional remedial measures at Trench-2 by assuming an effective cut-off at this location to be implemented simultaneously with the cut-off at KM 14. The results of our analyses are discussed below.

#### **13.3.2 Complete Cut-off at KM14 and at Trench -2**

Another set of analysis was performed by assuming a very effective cut off at Trench -2, along with the installation of a new cut-off trench at KM14. The results of the analyses for the upper part of Wadi Suq are presented on Figures 13.14, 13.15, 13.16, and 13.17 for 5, 10, 20, and 25 years after construction.

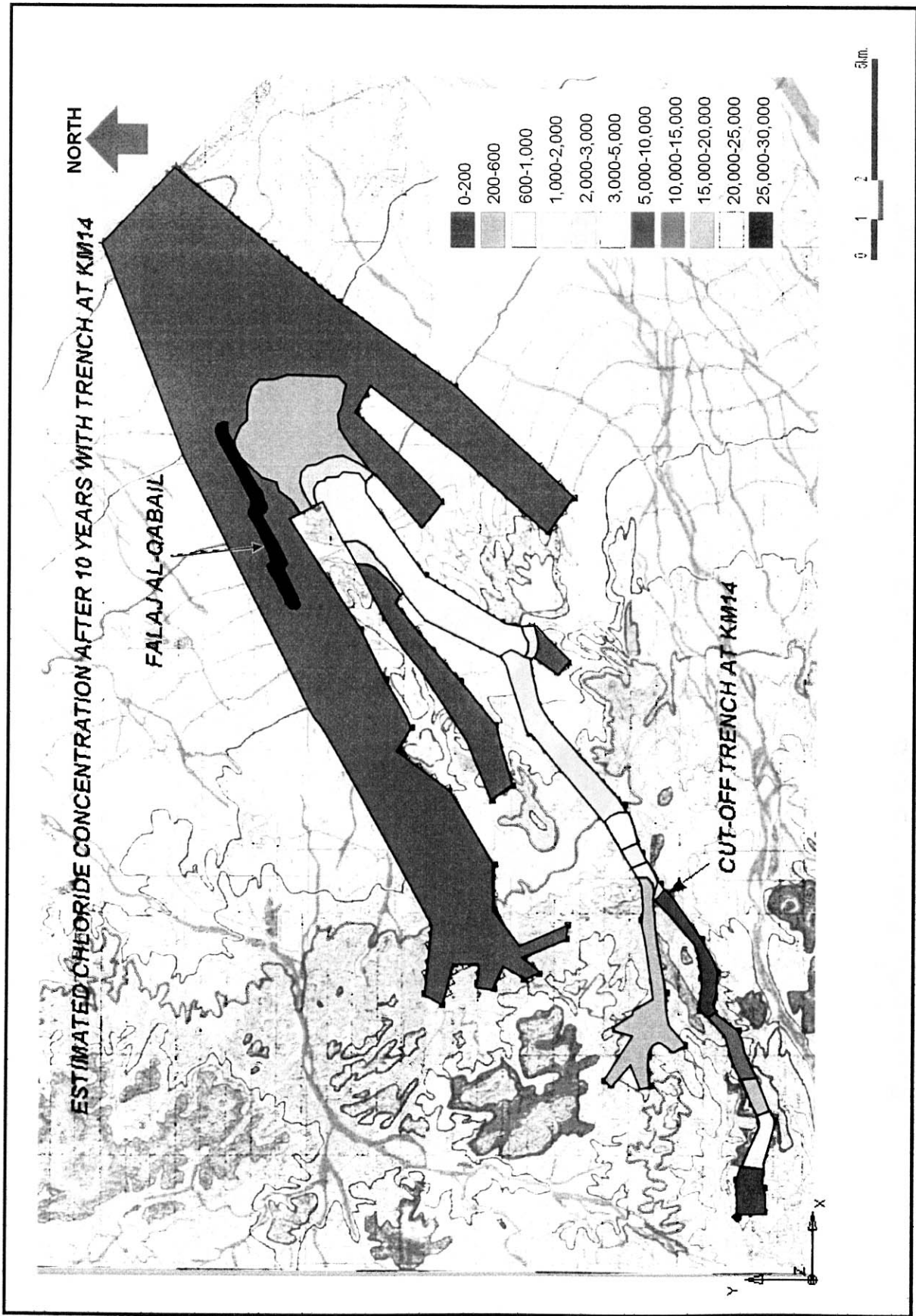


Figure 13.9 Estimated Chloride Concentration After 10 Years with Cutoff Trench at KM14

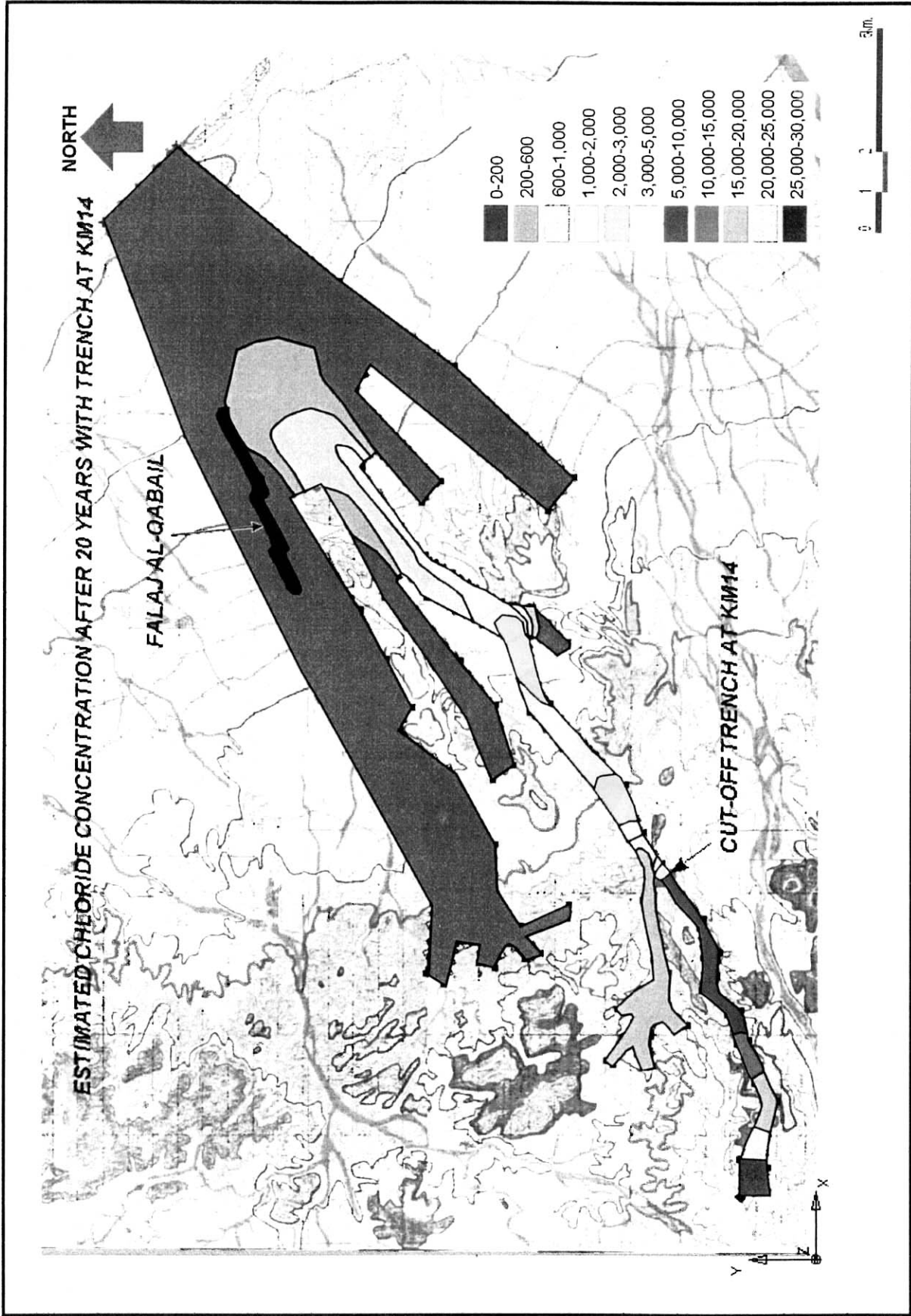


Figure 13.10 Estimated Chloride Concentration After 20 Years with Cutoff Trench at KM14

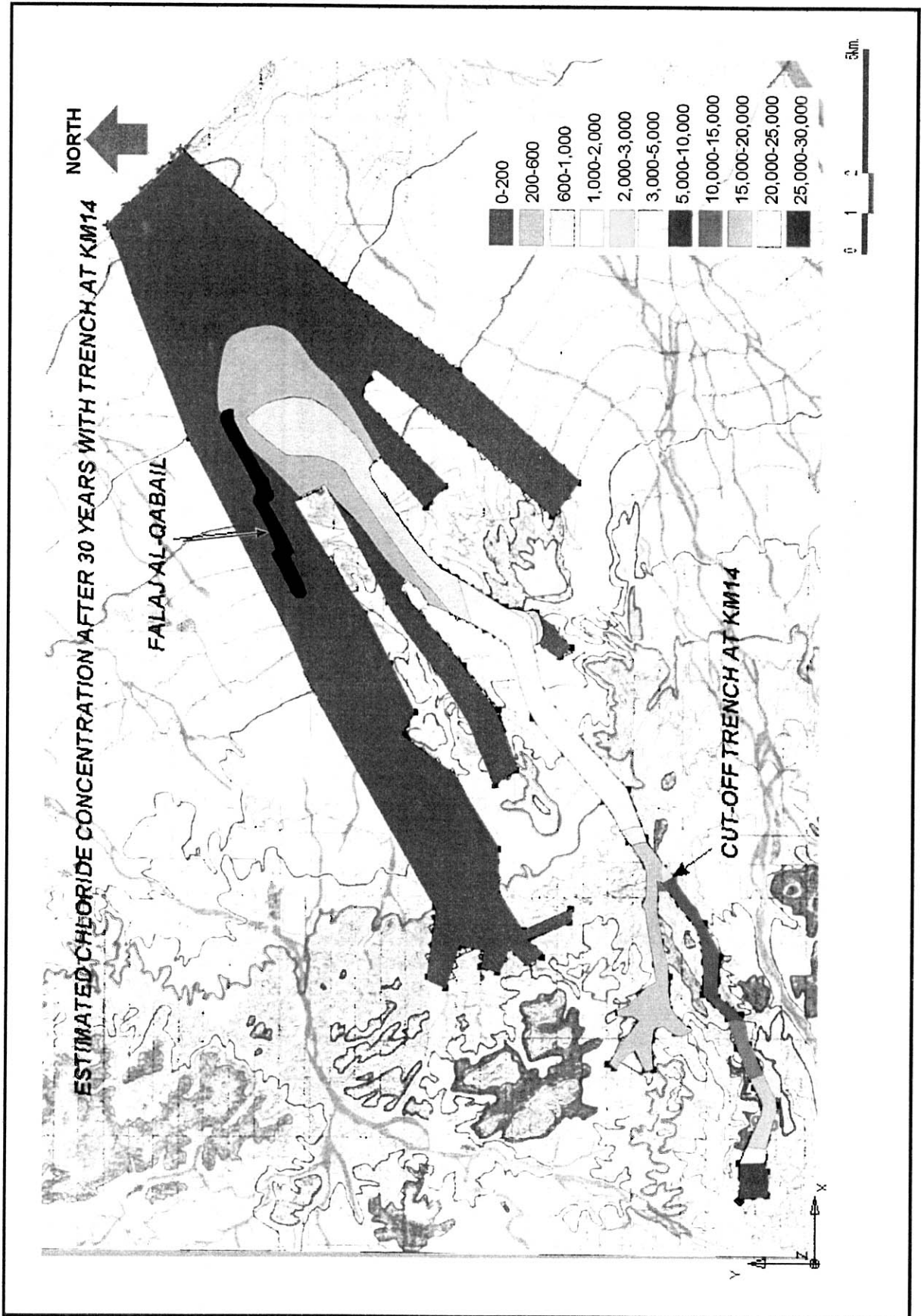


Figure 13.11 Estimated Chloride Concentration After 30 Years with Cutoff Trench at KM14