

10. Technical Impracticability Waiver and Containment Zone

10.1 Introduction and Provisions

This ROD issues a waiver of the requirement to attain ISGS levels, and other ARARs identified in Appendix A of this ROD, based on the technical impracticability of cleaning groundwater to ISGS levels. This waiver is issued pursuant to 42 U.S.C. §9621(d)(4)(C) and 40 C.F.R.-300.430(f)(1)(ii)(C)(3). This waiver shall apply solely to a region of groundwater defined in this section, which is called the TI waiver zone and containment zone, depending on the context, as discussed below.

EPA has recognized that much of the groundwater at the Joint Site can be restored to ISGS levels. In order to do so, a zone of dissolved phase contamination in groundwater surrounding the NAPL must be contained, thereby isolating the NAPL. This zone is called the **containment zone**¹. If this is achieved, dissolved contamination from the NAPL cannot reach the water outside the containment zone, and so the outside groundwater can then be cleaned to ISGS levels. It is technically impracticable to attain ISGS levels *inside* the containment zone, because the NAPL continues to dissolve into groundwater there. By establishing a containment zone, the greatest possible extent of the groundwater can be restored to concentrations below ISGS levels, in keeping with the requirements of the NCP. As specified in Section 9, the objective for water inside the containment zone is containment; the objective for groundwater outside the containment zone is restoration to ISGS levels.

Because it is technically impracticable to attain ISGS levels *inside* the containment zone, this same physical space is also referred to as the **TI waiver zone**. Groundwater outside the TI waiver zone is not subject to the waiver, and all ARARs identified in Appendix A remain in force there. Issuance of a TI waiver does not preclude that other standards or remedial actions apply to the contamination within the TI waiver zone in lieu of the particular requirements that are waived.

Figure 10-1 shows the TI waiver zone for the Joint Site in each hydrostratigraphic unit. In the chlorobenzene plume, the lateral extent of the proposed TI waiver zone is based on safely containing the DNAPL, and extends vertically through the Gage Aquifer. It does not include the Lynwood Aquifer or the Gage-Lynwood Aquitard. In the benzene and TCE plumes, the TI waiver zone extends vertically through the MBFC Sand. It does not include the Lower Bellflower Aquitard. The lateral extent of the TI waiver zone for the benzene and TCE plumes is

¹The use of the term “containment zone” in this ROD does not reflect a formal establishment of a containment zone as that term is used in, and per the requirements of, California State Water Resources Control Board Resolution No. 92-49(III)(H).

based on differing factors, depending on the hydrostratigraphic unit. This is fully discussed below.

EPA has utilized, as appropriate, the *Guidance for Evaluating the Technical Impracticability of Groundwater Restoration*, (U.S. EPA OSWER Directive 9234.2-25, October 1993). The presence of NAPL alone generally is not sufficient to justify a TI waiver. EPA guidance directs that a TI waiver be justified based on site-specific conditions. The guidance directs that EPA's justification of a TI waiver include the following elements, among others:

- The specific ARARs or media cleanup standards for which TI determinations are being made;
- The spatial area over which the TI decision will apply;
- The conceptual model which describes site geology, hydrology, groundwater contamination sources, transport, and fate;
- An evaluation of the restoration potential of the area to be subject to the TI waiver, including data and analyses that support the assertion that attainment of ARARs or media cleanup standards is technically impracticable from an engineering perspective;
- Any additional information or analyses that EPA deems necessary for the TI evaluation.

Appendix E of the JGWFS provides such justification in detail for the Joint Site. The following section serves only to summarize and provide highlights. This section also summarizes EPA's basis for selecting the size and location of the TI waiver zone in each of the hydrostratigraphic units.

EPA has *not* made a determination that *no* NAPL can or shall be removed from either the Montrose or the Del Amo Superfund sites. This ROD, in issuing this TI waiver, determines solely that existing technologies will be incapable of practicably recovering enough NAPL (essentially all of it) to attain ISGS levels at *all* points in groundwater. Hence, a waiver of the requirement to attain the ISGS must be issued for a portion of the groundwater surrounding the NAPL. This determination leaves open the broader determination as to whether and to what degree NAPL recovery or immobilization will occur at the Montrose Chemical and Del Amo Superfund sites. As previously established by this ROD, a second phase of this groundwater operable unit shall address this matter. Future remedial actions to address NAPL recovery or immobilization will be addressed by amendment(s) to this ROD (See Declaration and Section 4 of this ROD). There are many technologies which would be capable of recovering some of the

NAPL from the ground at either site. It is noted that the TI waiver guidance cited above also directs EPA to demonstrate “that contamination sources [NAPL] have been identified and have been, or will be, removed and contained to the extent practicable.” EPA’s second phase of remedy selection addresses this guidance provision.

10.2 Summary of Why NAPL Areas Cannot Be Restored to Drinking Water Standards

NAPL is known as one of the most challenging and recalcitrant of all Superfund problems. As already discussed, while in most cases there are technologies that can remove some NAPL, it is often necessary to remove virtually all NAPL before concentrations in groundwater near the NAPL can approach concentrations commensurate with ISGS levels. Presently, there are no technologies, which have been proven to be capable of removing *all* NAPL from large sites where NAPL is widely distributed laterally and vertically, and where stratigraphy is highly heterogeneous and complex.

At the Montrose Chemical Site, the soils are highly heterogeneous. DNAPL has migrated downward to great depths, potentially exceeding 130 feet below land surface, which correspond to the bottom of the MBFC Sand and the Gage Aquifer. DNAPL beneath the Montrose Chemical Site occurs in discontinuous thin layers that likely reside atop the heterogeneously distributed fine-grained sediments. The majority of the DNAPL is below the water table. The DNAPL relative saturation distribution has not been determined, and it is impracticable to do this to a highly accurate degree. Montrose Chemical Company is continuing, under EPA oversight, to evaluate the properties and distribution of DNAPL, and evaluate options for removing some DNAPL. However, it will not be practicable to remove enough (virtually all) DNAPL so as to attain drinking water standards in the immediate vicinity of the DNAPL.

At the Del Amo Site, there is also substantial heterogeneity in the soils. Although NAPL at the former Del Amo plant property consists primarily of benzene, and therefore is lighter than water (LNAPL), beneath the site it is primarily smeared below the water table. This distribution of LNAPL beneath the former Del Amo plant property is the result of low water levels at the time of the LNAPL release and subsequent rise of the water table for about the past 30 years. The LNAPL that has been located and subjected to extensive testing appears to be present at low (below residual) saturations. Therefore, the studied NAPL appears to be present primarily in ganglia and droplets held in pore spaces by capillary forces. The former Del Amo plant site also presents an additional complication of having many multiple sources of LNAPL which are located relatively close to each other. A region of dissolved-phase contamination surrounds *each* of these sources, but because of their mutual proximity, these regions overlap in a largely contiguous distribution. Thus, removal of virtually all the LNAPL would have to occur in all of the multiple areas before drinking water standards could be achieved. There remain some locations where NAPL may be present at higher residual saturations. As with respect to the

Montrose Chemical Site, Shell and Dow are working under EPA oversight to further evaluate options for removing some of this LNAPL. However, it will not be practicable to remove enough of the LNAPL to attain drinking water standards.

The reduction in concentration of dissolved contaminants to ISGS levels is not practicable in the groundwater surrounding the multiple LNAPL sources located at the Del Amo Site because (1) removal of the NAPL sources is not technically practicable, (2) restoration could never be complete due to the continuing migration of benzene from the LNAPL sources; (3) extraction wells in the fine-grained UBF and MBFB would have extremely small radii of influence, which would necessitate impracticably large numbers of wells needed to capture and remove contaminated groundwater; and (4) the removal of the dissolved contamination in the MBFC, directly underneath the LNAPL is not practicable because it could cause adverse downward migration of contaminants from the overlying LNAPL sources, which will prevent the restoration this portion of the MBFC to ISGS (See Appendix E of the JGWFS).

Significantly more detail on this argument is provided in Appendix E of the JGWFS.

10.3 Non-NAPL Contaminants in the TI Waiver Zone

Where TI waivers are applied, the waiver is applied to *all* chemicals within the TI waiver zone, regardless of whether all of the chemicals served to base the original justification for the waiver. For example, if there is a TI waiver zone due to benzene as NAPL, all other contaminants in the same zone that are not present as NAPL would also be subject to the waiver.

Attempting to restore an incidental contaminant to ISGS levels that is present only in the dissolved phase within the TI waiver zone would impose the same remedial actions on the TI waiver zone that are otherwise waived due to the contaminant that is present in the NAPL phase. It would not be practicable, for instance, to apply hydraulic extraction and treatment to reduce dissolved naphthalene to ISGS levels, while the same water would also contain exceedingly high dissolved phase concentrations of benzene, which would not be reducible due to the presence of benzene NAPL. Such high concentrations of NAPL contaminant would dominate the capacity of the treatment technology, prohibiting reductions of dissolved naphthalene to ISGS levels. Second, such actions might induce adverse movements of high-concentration dissolved benzene or chlorobenzene contamination into areas where it is not currently present, and/or downward migration of DNAPL at the Montrose Chemical Site. Finally, it does not provide a significant environmental benefit, in this case, to attempt to remove the incidental dissolved phase contaminants, when the contaminants which serve as the primary risk drivers are also present as NAPL and will remain indefinitely within the TI waiver zone at exceedingly high concentrations.

10.4 Extent and Configuration of the TI Waiver Zone

In addition to establishing the need for a containment zone, this ROD also establishes the extent and configuration of the zone. The containment zone selected by this ROD differs in extent and configuration, depending on the plume and the hydrostratigraphic unit in question. EPA has based this selection on a set of consistent principles. EPA intended that the extent and configuration of the TI waiver zone should:

- Have a supportable technical basis;
- Be as small as reasonably possible while still meeting all objectives of the remedial action;
- Allow for limiting the potential for adverse migration of NAPL;
- Allow for limiting the potential for adverse migration of dissolved phase contamination;
- Allow for maximum efficiency in monitoring and assessing compliance with the requirement of containing contamination within the TI waiver zone;
- Avoid complicating the remedial action, its design, and implementation to the point that implementability is compromised or questionable; and
- Eliminate the potential for requiring remedial actions, which would provide no tangible environmental or protective benefit.

The first two principles arise from the fact that the TI waiver zone applies by definition to the groundwater for which it is truly impracticable to attain ISGS levels in a reasonable time frame. By corollary, in accordance with the NCP with EPA guidance on TI waivers, and with consideration to State of California Water Resources Control Board Resolution 92-49(H) [a.k.a. "Containment Zone Policy, which contains a provision that containment zones be kept as small as possible], it is EPA's intention to attain ISGS levels for the greatest practicable extent of groundwater. EPA did not extend the TI waiver zone beyond the reasonable technical basis for its existence.

EPA rejected assorted arguments informally suggested during the feasibility study process that the TI waiver zone should be extended to contain the entire contaminant distribution, more than a mile from the former plant properties and affecting six hydrostratigraphic units. This clearly would have been an inappropriate use of a TI waiver because, regardless of any relative difficulties or risks which might exist in attempting to restore groundwater in the downgradient portions of the plume, it *is* technically practicable to do so and to do so without compromising

the objectives of the remedial action (e.g. inducing significant adverse downward movements of NAPL). It is the NAPL which is the foundation of and gives rise to the TI waiver zone in this case; broad extension of the TI waiver zone outside the area of NAPL and potential influence on NAPL would not be appropriate.

At the same time, the second principle states that the TI waiver zone is to be as small as possible, *provided that all objectives of the remedial action can still be obtained*. This second phrase is also important to EPA's selection of the extent and configuration of the TI waiver zone. Most of the principles following the second principle arise from this consideration. In making this selection, EPA has placed "technically impracticable" within the context of all objectives of the remedial action, the attainment of which lead to the protection of human health and the environment. There are areas of groundwater within the Joint Site which, in the strictest sense, could potentially be restored to ISGS concentrations, at least temporarily. However, it would *not* be technically practicable to do so without compromising other basic objectives of the remedial action. Such areas are, therefore, included in the TI waiver zone. In keeping with the second principle, these areas have been kept as small as reasonably possible.

The evaluation of the lateral extent of the TI waiver zone and the means of containment of contaminants within this zone were made separately for each contaminant plume in each hydrostratigraphic unit. However, because the LNAPL and DNAPL TI waiver zones largely overlapped when evaluated separately EPA has established a single TI waiver zone for the Joint Site as the union of these two zones in each hydrostratigraphic unit. The technical factors accounted for by EPA in this evaluation include (1) physical processes affecting migration of contaminants, (2) the hydrostratigraphic conditions of the affected units, and (3) the amount and quality of data being used in any given hydrostratigraphic unit in the JGWFS groundwater model (See Section 11.1), and hence the degree of certainty/usability of the model on a case-specific basis. The basis for the TI waiver zone is discussed briefly below for the chlorobenzene, benzene, and TCE plumes.

Chlorobenzene Plume

The portion of the containment zone/TI waiver zone that lies within the chlorobenzene plume is larger than the extent of NAPL itself (i.e., includes portions of the dissolved plumes immediately adjacent to NAPL). The reason for this and the basis used to determine extent of this portion of the TI waiver zone is discussed below and in Appendix E of the JGWFS.

As determined in the JGWFS, and discussed in Section 11.1 of this ROD, active hydraulic extraction and treatment (pumping) is the sole effective means by which the dissolved contamination surrounding the DNAPL at the former Montrose plant property is contained (thereby isolating the DNAPL source). Therefore, EPA considered the implications of such pumping in determining the size of the part of the containment zone that lies in the

chlorobenzene plume. The alternatives modeled for this remedial action were developed so as to ensure that DNAPL would not be mobilized by the hydraulic extraction that creates the containment zone. The minimum necessary distance downgradient of the DNAPL at which to place containment wells so as safely limit drawdown in the DNAPL area was evaluated using a groundwater model (discussed in Section 11.1). Using this approach, the containment zone within the chlorobenzene plume is determined to be the minimum area that allows for hydraulic containment of DNAPL without adversely affecting DNAPL migration. This zone is larger than the area where DNAPL actually occurs. The containment zone must be subject to the TI waiver, because the DNAPL remaining inside the containment zone continuously contaminates any water that is within the zone.

Vertically, the TI waiver zone in the chlorobenzene plume extends to the Gage Aquifer. The best information available indicates this is the depth to which DNAPL may have migrated. It is noted that direct and certain identification of NAPL at the depth of the Gage Aquifer, and finding the greatest depth to which NAPL has migrated, are extremely difficult in this type of heterogeneous environment. However, dissolved and sorbed phase concentrations in both the MBFC Sand and the Gage Aquifer are high enough to be indicative of the likely presence of NAPL. It is important to note that the TI waiver zone does not extend to the Gage-Lynwood Aquitard and Lynwood Aquifer; the area of chlorobenzene contamination in the Lynwood Aquifer shall be restored to ISGS levels.

The majority of the chlorobenzene plume lies outside the TI waiver zone. (Section 2 and Appendix E of the JGWFS). The plume of dissolved contaminants extends more than 1.3 miles from the former Montrose plant in the MBFC Sand and as much as a mile in the Gage Aquifer, and vertically occurs as deep as in the Lynwood Aquifer. Based on the results of the JGWFS, it is feasible to restore the area of the chlorobenzene contamination to ISGS levels (e.g. drinking water standards) outside the TI waiver zone, and such a reduction would have an effect on concentration, mass, future contaminant migration, and risk reduction of the chlorobenzene plume.

Benzene Plume in the UBF and MBFB Sand

This discussion pertains only to the benzene plume in the first two units, the UBF and the MBFB Sand. The water table occurs in one of these units, depending on the location within the Joint Site. (See Section 7, "Summary of Site Characteristics," or the JGWFS, or the Remedial Investigation Reports). Again note the definition of plumes used by this ROD (See "Conventions for Dividing the Contamination into Plumes," in Section 7.2 of this ROD). As with the TI waiver zone in the chlorobenzene plume, the size of the TI waiver zone in the benzene and TCE plumes in these units is somewhat larger than the actual NAPL distribution. The basis for this is discussed in the course of the discussion below.

Basis for Not Establishing Multiple TI Waiver Zones in These Units

As previously discussed, the benzene plume in these units is characterized by a large number of multiple residual sources, each with associated dissolved phase contaminant distributions which have commingled into a single commingled distribution with steep or tight (i.e. large) concentration gradients; that is, the benzene concentrations fall off quickly with distance from the NAPL source. This observation is partially masked by the fact that there are very few places within the benzene plume where, as one moves downgradient from a given source, another source does not occur before end of the extent of contamination from the first source. Hence, at most points within the benzene plume, the benzene present is a result of a contribution from one or more NAPL sources. When observing the distribution as a whole, however, the concentration gradients are large (i.e. the concentrations taper off sharply with distance from the NAPL source) and the benzene plume appears to be stable. The primary reason for these observations is intrinsic biodegradation of benzene, although it also could be partially attributed to the small hydraulic gradient and groundwater flow velocity of these units.

EPA finds that it would not be practicable to restore water *between* the multiple NAPL sources at the former Del Amo plant, as they are so close together. In the course of attempting such restoration, contaminants likely would be pulled from surrounding sources. In addition, even if it were possible, such restoration of very small zones of clean water (on the order of a few hundred feet, at most, in size) in close proximity and in the midst of the multiple sources, essentially would provide no environmental benefit. Whether on the basis of contaminant mass, migration, or risk and concentration, the reduction of dissolved phase concentrations in these small areas would provide virtually no increase in the certainty of containing contaminants vertically or laterally, nor would the relative health risk be reduced in the event that the groundwater were used. It is noted that there would be no feasible use of groundwater from these localized “islands” of clean groundwater in the midst of the NAPL sources, because of their proximity to the NAPL sources. Finally, the long-term effectiveness and certainty of the groundwater remedy would be largely unaffected by such actions. For these reasons, EPA did not establish multiple small TI waiver zones within the benzene and TCE plumes in these units, but rather a single zone.

Basis for Establishing the TI Waiver Zone at the Boundary of the Existing Benzene Plume in These Units

In addition, based on the reasons discussed above and in Appendix E of the JGWFS, the ability of the available practicable remedial actions to decrease the extent of the dissolved benzene plume is at best highly limited. First, the size of the areas within the benzene plume that can be restored to MCL will be limited by the proximity of LNAPL sources and will not likely exceed several hundred feet. Second, the restoration of this limited area will never be complete due to

the continuing dissolution of LNAPL into groundwater (See Appendix E of the JGWFS). Accordingly, EPA has decided not to attempt to reduce the volume of, the benzene plume. *The TI waiver zone in the UBF and MBFB Sand is based on the area presently congruent with the existing benzene plume, as measured by the maximum contaminant level (MCL, the drinking water standard) for benzene (1 ppb).* The justification for this is discussed in detail in Appendix E of the JGWFS.

“Vertical Proximity” Basis for Extending the TI Waiver Zone into the MBFB Sand Under the Former Butadiene Plancor of the Del Amo Plant

Finally, there is an area of benzene contamination in the UBF (uppermost unit) in the former butadiene plancor of the Del Amo plant, near what is today called the “WRC building,” and to the south of this building. Figure 7-2 shows this area as a scorpion-tail-shaped area on the easternmost portion of the UBF benzene distribution. In this location, there are two regions with direct observations of NAPL in the subsurface, and groundwater concentrations approach or equal the benzene solubility limit. EPA notes that wells were not installed in the MBFB Sand directly under this location. While wells with non-detect results located slightly downgradient provide a reasonable limit on the lateral extent of potential benzene contamination in both the MBFB Sand and the MBFC Sand, it has not conclusively been shown whether there is benzene in the MBFB Sand at this location. This ROD requires that this information be collected during the remedial design phase.

EPA has considered, if contamination does exist in the MBFB Sand directly under these NAPL sources, whether it would be practicable to restore the MBFB Sand at that location to ISGS levels. The MBFB Sand directly underlies the UBF with little to no separation to provide a significant barrier to the movement of contaminants. If the TI waiver does not extend to the MBFB Sand under this area of contamination in the UBF, it would be required that the benzene contamination in groundwater in the MBFC Sand be cleaned to ISGS levels. To achieve ISGS levels in this area, hydraulic extraction would be required directly under the benzene NAPL and the extremely high concentrations of dissolved benzene present in the UBF at this location. Such hydraulic extraction could increase vertical gradients between the UBF and MBFB Sand, which could cause the downward movement of dissolved benzene from the UBF to the directly underlying MBFB Sand. While gradient controls (such as limited counter-pumping in the UBF) could be applied, it would not be practicable to limit the contaminant movement from the UBF to the MBFB Sand to such a degree (virtually zero) that drinking water standards (1 ppb for benzene) could be achieved and maintained at this location in the MBFB Sand. The potential downward migration of high-concentration dissolved benzene caused by such pumping would more than offset benefits which might be derived from restoring water directly under the NAPL to ISGS levels. It is noted that there is no feasible use of groundwater directly under the NAPL in the UBF because of its proximity to the NAPL.

Therefore, while there may in fact be no contamination at all in the MBFB Sand at this location, it would not be practicable to restore this water to ISGS levels if contamination does exist. Based on this, EPA has extended the containment zone/TI waiver zone into the MBFB Sand directly under the LNAPL sources in the UBF. The extent of this portion of the TI waiver zone is based on the footprint of the contamination in the overlying UBF at this location. The TI waiver is extended to the MBFB Sand at this location due to its *vertical proximity* to the NAPL sources in the UBF. The argument for doing so is similar to the argument for extending the TI waiver zone laterally beyond the NAPL itself in any given unit due to *lateral proximity* to the NAPL.

EPA explicitly notes that the selected TI waiver zone for the benzene plume in the MBFB Sand is *not* based on the footprint of the benzene contamination in the overlying UBF at *all* locations in the MBFB Sand. This is only true in the area of the former butadiene plancor of the Del Amo plant. At other locations, the TI waiver zone in the benzene plume for the UBF and MBFB Sand are based on the present extent of benzene contamination in those units, respectively. This results in the TI waiver zone in the MBFB Sand being slightly smaller than in the UBF.

TCE Plume in the UBF and MBFB Sand

The TCE plume within the UBF and MBFB Sand is commingled with the benzene plume (see Figures 7-3 and 7-4). However, it does not extend as far downgradient as the benzene plume surrounding the waste pit area at the southern boundary of the former Del Amo plant property. The approach to the TCE plume is discussed further in Section 11 of this ROD.

Because the TCE plume in these units is *inside* the benzene plume, the TI waiver zone for the TCE plume in these units is the same as for the benzene plume, described above.

Benzene & TCE Plume in the MBFC Sand

The extent of the TI wavier zone in the MBFC Sand must be discussed in terms of both the benzene and TCE plumes at the same time. This is because the extent of the TI waiver zone in the MBFC Sand is not based on either the extent of the benzene plume or the TCE plume in that unit, but rather on the extent of the benzene plume in the MBFB Sand, the unit above. As discussed in Section 2 and Appendix E of the JGWFS, the presence of NAPL in the MBFC Sand, in either the benzene or TCE plumes, cannot be confirmed at this time with sufficient certainty upon which to base a TI waiver for the MBFC Sand.

Unlike the upper two units, the TCE and benzene plumes are not commingled in the MBFC Sand. The benzene plume in the MBFC Sand is limited to the area surrounding the Del Amo waste pits. There is no TCE at this location. The TCE plume is present to the north of the Del Amo Waste Pits, where the benzene plume is absent. Additional sampling will be conducted to

determine the exact extent of the TCE plume, but its dimensions are bracketed by the existing sampling locations. It is known that the extent of the TCE plume does not reach the Del Amo Waste Pits area, and its major source appears to be at or near several solvent-handling facilities just northwest of the MW-20 LNAPL area located at the northern end of the benzene distribution in the UBF/MBFB Sand.

“Vertical Proximity” Basis for Extending the TI Waiver Zone to the MBFC Sand

The benzene and TCE plumes in the MBFC Sand lie under and in vertical *proximity* to the LNAPL sources and the high-concentration dissolved benzene contamination in the UBF and MBFB Sand. Even though the presence of NAPL in the MBFC Sand in the benzene and TCE plumes has not been conclusively determined, EPA has extended the TI waiver zone to include the MBFC Sand in these plumes because of its location underneath the LNAPL sources. The rationale for this is as follows:

The MBFB and MBFC Sand are separated by a thin layer of mud, which exists only in the western portion of the Del Amo Site, and pinches out in the central portion (See Section 2 of the JGWFS). Without a TI waiver for the MBFC Sand, it would be required that the groundwater in the MBFC Sand be cleaned to ISGS for both TCE and benzene. To do so, hydraulic extraction would be required directly under the benzene NAPL and the extremely high concentrations of dissolved benzene present in the MBFB Sand. Such hydraulic extraction could induce vertical gradients, which in turn could cause the downward movement of dissolved benzene and TCE from the MBFB Sand to the MBFC Sand. The discontinuous layer of mud between these units will not likely serve as a sufficient barrier for such migration. While gradient controls (such as limited counter-pumping in the MBFB Sand) could be used to offset the increase in vertical gradients and limit the adverse downward movement of contaminants, it would not be practicable to limit the contaminant movement from the MBFB Sand to the MBFC Sand to such a degree (virtually zero) that drinking water standards (1 ppb for benzene) could be achieved and maintained in the MBFC Sand.

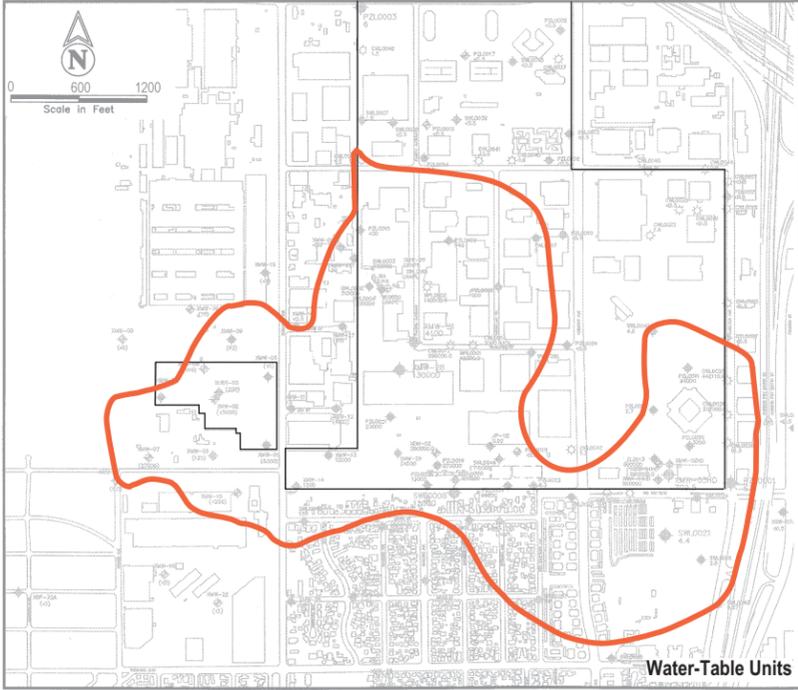
Basis for Establishing the Boundary of the TI Waiver Zone in the MBFC Sand as the Footprint of the Contamination in the Overlying MBFB Sand Benzene Plume

Based on the above discussion, the basis for extending the TI waiver zone to the MBFC Sand depends on vertical proximity of the contamination in the MBFC Sand to the LNAPL sources and high-concentration dissolved contamination in the MBFB Sand. Therefore, it is appropriate to define the boundary of the TI waiver zone in the MBFC Sand not in terms of the extent of the TCE and benzene plumes in the MBFC Sand but in terms of the footprint of the overlying MBFB Sand benzene LNAPL and high-concentration dissolved contamination (e.g. the projection of the lateral boundary of the benzene plume in the MBFB Sand onto the MBFC Sand). When the extent of the TI waiver zone in the MBFC Sand is defined in this way, it

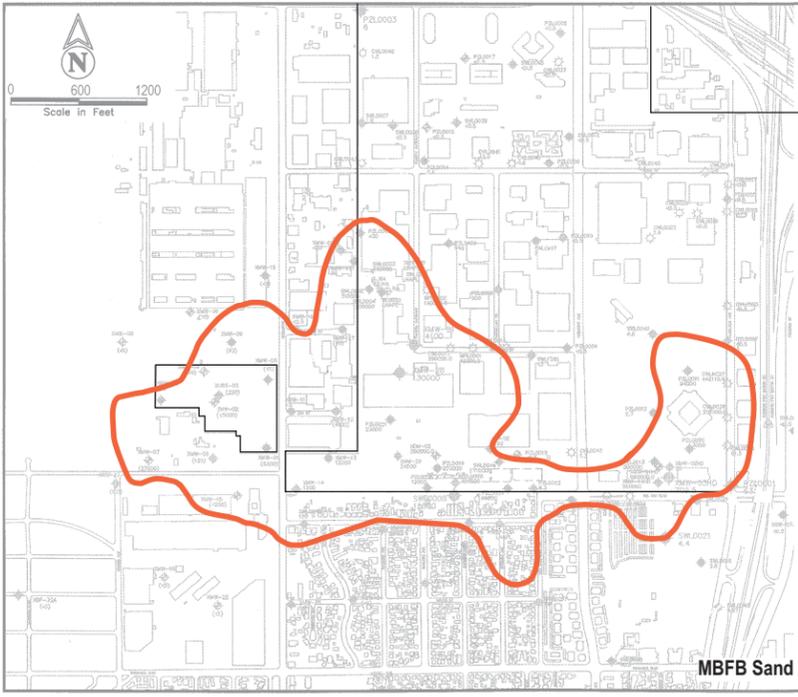
encompasses both the benzene and TCE plumes in the MBFC Sand. It is noted that the fine-grained LBF, which falls between the MBFC Sand and the Gage Aquifer, would *not* be subject to a TI waiver outside the chlorobenzene plume.

10.5 Contaminants Moving Outside of TI Waiver Zone Become Subject to All ARARs

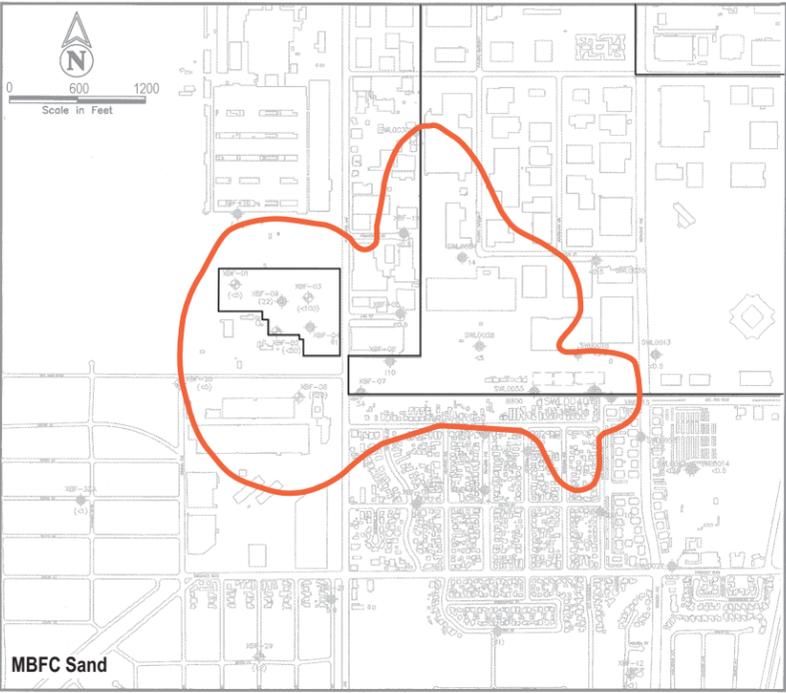
The TI waiver applies to the region of groundwater defined by Figure 10-1. The TI waiver does not apply outside the region. Contamination which may originate inside the TI waiver zone but over time come to be located outside the TI waiver zone are subject to all other applicable requirements of this ROD, including but not limited to the requirement that all ARARs be attained.



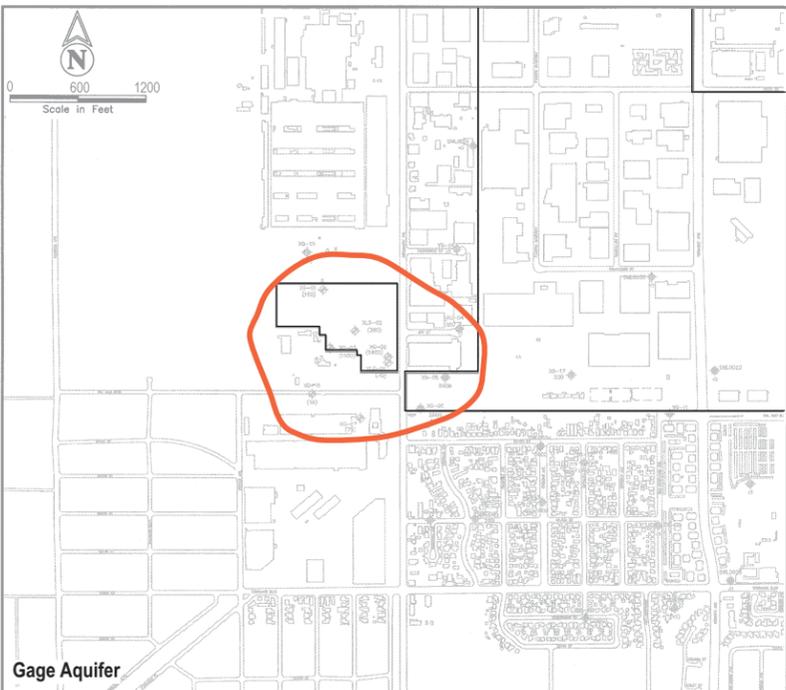
Water-Table Units
(UBF & MBFB)



MBFB Sand*

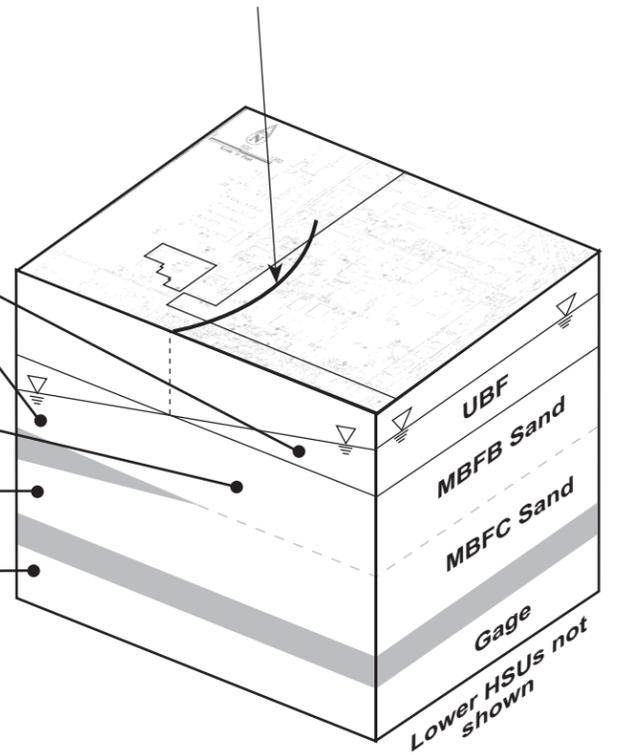


MBFC Sand



Gage

Approximate location of demarcation line,
where Water Table crosses the contact
between UBF and MBFB Sand.



* MBFB Sand is a water-table unit west of the demarcation line and is a confined aquifer east of the demarcation line (See Section 2 of the JGWFS)

Figure 10-1
TI Waiver Zone for the Joint Site
Record of Decision
Dual Site Groundwater Operable Unit
Montrose and Del Amo Superfund Sites