groundwater is generally clean (flow lines were not color-coded to represent 1,1,1-TCA given that off-Facility migration of this compound is relatively limited).

5.30.1 Shallow Groundwater Flow

As shown on Figure 11A ("wet season" shallow contours), a groundwater divide exists between the GCC Site and the Trinity Oil Site to the northwest, in the vicinity of Leland Street.[17] This divide is evident in all of the monitoring rounds conducted to date, and is consistent with the GIS mapping and surface topography (see inset in Figure 12).

- Shallow groundwater flow is from the upland area to the northeast (see surface topography on Figure 12), across the facility and then generally toward the headwater of the drainage ditch to the southwest of the facility.

- The groundwater from the northwestern portion of the facility initially flows southwest. Flow is then diverted to a more southerly and then southeasterly direction by the groundwater entering the Site from the upland area southwest of the condominium housing[18] (see surface topography on Figure 12). This flow path carries water from the northwestern portion of the facility toward the monitoring well CDW-9 and PZ-2 areas prior to discharging into the drainage ditch.

    - The degree to which this flow extends to the southwest prior to discharging into the drainage ditch depends on the amount of groundwater flow entering from the condominium housing, as shown by comparison of Figures 11A and 11C (wet season and dry season shallow contours).

- Shallow groundwater from the remainder of the facility flows southwest, directly to the drainage ditch.

- Downgradient of the facility, the groundwater contours generally parallel the drainage ditch, demonstrating that the ditch forms a groundwater sink for this wetland area. Farther downstream, the groundwater contours on the eastern side of the drainage ditch tend to "flare out," moving more to the north to parallel the oxbow in the ditch alignment. This trend appears to be augmented further to the north of the oxbow by the increase in ground surface elevation (see surface topography on Figure 12), as would be expected. The overall gradient toward the ditch varies seasonally, with the contours encroaching on the ditch during wet seasons.

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[17] As discussed subsequently, this divide does not extend all the way down into the bedrock due to the industrial pumping well.

[18] It is noted the groundwater flow from the condominium housing is likely augmented to varying amounts via surface infiltration from irrigation of the grassed areas around the complex (the grass appears well watered, particularly during dry periods). This conclusion is supported by data from well CDW-14, which, at times, appears to be significantly higher than would be expected based on other monitoring well data.

- In the vicinity of the drainage ditch, the vertical gradients are generally upward,[19] as is consistent with groundwater discharge to the ditch. These vertical gradients (direction typically measured) are depicted on Figure 12.

- Course Brook forms a more regional sink for groundwater flow from the Site, as compared to the surface water drainage ditch. As such, groundwater flow from the Site does not traverse the Brook alignment. This conclusion is based, in part, on the surface topography[20] which shows a substantial increase in elevation (nearly 150 feet) just to the southeast of the drainage ditch/Course Brook confluence (see Figure 12). This conclusion is further supported by the upward vertical gradient persistently evident in the PZ-4 piezometer cluster.

5.30.2 Deep Overburden Groundwater Flow

The deep overburden groundwater flow contours mirror, in a general way, the sand contours (se figures 11C and 11D). Typically, the deep contours exhibit an approximately 1 foot higher contour value. This generalization is most evident in the downgradient portions of the Site. These data demonstrate a general upward vertical gradient from the deeper, low permeability deposits to the upper, high permeability deposits. This is as expected given the Site is collocated with a wetlands.[21] The three significant deviations from the above generalization are:

- The northeastern portion of the Facility shows a generally downward vertical gradient from the sand to the deeper overburden. This is likely due to the bedrock pumping well and/or to the location of this portion of the Site in a relative upland area as compared to the wetlands to the southwest.

- To the southeast of the Facility, there appears to be a linearly trending groundwater sink between boring GZ-2 and GZ-14M. This line sink appears to be consistent with both the geology (GZ-14 shows a more pervious soil at the top of the till, likely an erosional feature) and the topology of the till (as shown on Figure 10, this alignment generally follows a steep slope into a low area at GZ-14, thus supporting the erosional hypothesis). Additional discussion is provided below.

- The deep overburden groundwater contours to the east of the line sink show a significant change in alignment and a flattening of the gradient along the aqueduct right of way. This pattern may be indicative of hydrologic influence

[19] It is noted that at times specific surface water gauging points show a downward gradient relative to the sand deposit below, while vertically upward gradients persist within the sand deposit. It is believed that these localized perturbations are likely due to transient conditions which do not invalidate the overall Site Model.
[20] General hydrologic principles dictate that groundwater elevations generally mimic ground surface elevations.
[21] Wetlands are typically located in topographically low areas, which are also often groundwater/surface water discharge points, such as are the conditions at the GCC Site. Upward vertical gradients are consistent with groundwater discharge from upland areas (the location of the GCC facility) to lowland surface water bodies (the drainage ditch).

of the aqueduct on groundwater flow. While salient relative to formulation of the CSM, this area is generally outside of the Site boundaries.

- As evident in both the dry and wet season contours, deep flow from the southeastern portion of the facility travels along a line sink ending in the vicinity of monitoring well GZ-14M. As described above, the boring log for this location shows a relatively more pervious zone at the top of the till deposit. It is believed that this material is likely part of the till which has been reworked by meltwater. As shown on Figure 10, this well lies along the bottom of a northwest to southeast trending trough in the glacial till surface.
  - These more pervious soils likely provide a preferential zone for groundwater flow, thus explaining the shape of the groundwater contours along the line sink and the relatively higher VOC concentrations in monitoring well GZ-14M. As is shown by the color-coded flow lines, groundwater from both the PCE and TCE DNAPL areas flows along the line sink to the vicinity of this well. As shown on Figure 13, the fingerprint of the VOCs detected in this monitoring well matches that which would be expected based on the above described flow path.
  - The areas of reworked till are likely to be confined to the bottom of the trough and appear to be of limited extent. This conclusion is based on the absence of these more pervious zones on top of the till at the downgradient end of the trough (see borings GZA-15, GZA-17 and GZA-18).
- While more pervious reworked till areas may provide some preferential groundwater flow, they do not result in any significant deviation from the CSM pursuant to the discharge of the VOC plume into the surface water flow. As shown on Figure 10, this conclusion is supported by the following data:
  - The genesis of the reworked till relegates its location to the lower portions of the till surface, i.e., the northwest to southeast trending trough.
  - Mapping of the till surface demonstrates that the lower portions of the trough terminate within the Site prior to the oxbow in the drainage ditch alignment.
  - Groundwater contours for the deep overburden deposits show that horizontal deep groundwater flow is across the trough, generally perpendicular to its axis, towards the drainage ditch. These contours also show that this flow is substantially influenced by the drainage ditch (groundwater sink) in the vicinity of the collocated trough terminus and oxbow.
  - Upward vertical gradients drive this flow upward to its ultimate discharge into the surface water.

- The deep VOC isopleths demonstrate contaminant migration to the surface water drainage ditch; the terminus of the till trough is clean as demonstrated by monitoring wells GZA-17 and GZA-18.

- The deep overburden groundwater flow contours also explain the relatively higher VOC concentrations in monitoring well GZA-19DD. While the details of the flow path vary somewhat from the wet season to the dry season, in both cases, the groundwater in the vicinity of this monitoring well primarily originates in the PCE source area (see color-coded flow lines on Figures 11B and 11D and VOC fingerprint on Figure 13). The groundwater contours also show that the ultimate discharge point for the VOCs in the vicinity of monitoring well GZA-19DD is the surface water, as is the case for the VOCs in the vicinity of monitoring well GZ-14M.

5.30.3 Bedrock Groundwater Flow

The bedrock groundwater flow direction is the one major change to the CSM. Up until recently, it was believed that the bedrock flow direction would generally parallel overburden flow. Given the data[22] and generally accepted hydrologic principles, there was no reason to believe otherwise.

- To remove the uncertainty associated with the flow direction, a third bedrock well was installed. Data from this well became available at approximately the same time as the pumping test baseline data was being obtained. This work resulted in two new pieces of data.
  - The elevation gauging rounds demonstrated that the flow direction in the bedrock was toward the northwest rather than the southeast.
  - The baseline transducer data indicated that the groundwater elevation in monitoring well GZ-7R was cyclically fluctuating over a wide range (over 4 feet) at a high frequency (as is typically associated with the cycling of a groundwater extraction pump). This lead to further research into the existence of off-Facility pumping; the industrial production well was thus identified.

- All of the bedrock flow direction data is presented graphically on Figure 11E. This figure shows that:
  - The seasonal flow direction varies from north-northwest in the spring to southwest in the summer (purple arrows on Figure 11E). However, these directions were based on manual water level measurements which do not

[22] Up until relatively recently, data was available at two points in the bedrock; three are required to definitively determine flow direction. In addition, initial research indicated that there were no pumping wells proximate to the Site.

reflect the cyclic fluctuations in GZ-7R, given that the fluctuations were not known to exist prior to the transducer gauging. As such, these measurements likely vary from the mean of the cyclic amplitude by as much as 3 feet.

- The late summer/fall transducer data was then evaluated and both the high and low readings were used to establish a range in the direction (dashed arrows subtending blue shading on Figure 11E). This range extends over nearly 180 degrees, from the northeast to the southwest. However, the general Site groundwater flow will respond to the average head in the well given the frequency of the cycle. This direction, north-northeast, is the largest arrow (blue) on the Figure.

- Based on the current data, it appears that the flow direction may vary from northeast to the southwest.[23]

- The flow direction determined from the average of the cyclic data (blue arrow), a flow direction likely to be correct for the "dry season,"[24] shows that flow from the on-Site overburden plume area is generally toward GZ-7R. As such, this well constitutes a downgradient bedrock well for the Site.

- In the absence of any pumping from the industrial bedrock well, it still appears that the natural bedrock flow direction is toward GZ-15R. Therefore, this well provides a downgradient sampling location representing time frames prior to installation of the industrial bedrock pumping well.[25]

5.40 CONTAMINANT MIGRATION

An understanding of contaminant fate and transport begins with knowledge of the nature and extent of the contaminant source. At the GCC Site, the primary sources are chlorinated VOCs (PCE, TCE and 1,1,1-TCA) which have, in DNAPL form, penetrated the upper soil profile to the top of the glacial till deposit at the Facility (refer to Figure 9 and prior discussion of contaminant sources above). The data indicate that three primary DNAPL areas exist generally along the southwestern facility boundary. The individual PCE, TCE and 1,1,1-TCA areas are delineated on Figure 9. These compounds in their soluble form, along with their breakdown products (primarily cis-1,2-DCE) and Dichloromethane from a non-DNAPL source, continue to migrate downgradient along

[23] The lack of a definitive bedrock flow direction(s) for both the dry and wet seasons constitutes a clear data gap, as does the lack of a well log and record of the pumping volume over time. To address these gaps, it is proposed that the water level in GZ-7R be continuously monitored with a transducer for at least one year. Attempts to acquire the well log and flow data will continue to be pursued.
[24] This conclusion is predicated on relative consistency of pumping from the production well.
[25] It is noted that the industrial well has been in operation for less than five years.

with the shallow and deep overburden groundwater flow, with ultimate discharge to the surface water on Site.[26]

5.40.1 Shallow VOC Plume

Migration of the VOC plume in the upper, sand deposits is shown on Figure 8. The total VOC isopleths are directly depicted on this Figure. Isopleths for the individual compounds are indirectly depicted via the colored "pie charts." This method of presentation, rather than individual isopleths on separate figures, facilitates CSM development and verification given that it correlates the otherwise disparate data sets. Further correlation is provided between the groundwater flow paths from primary DNAPL areas (see Figure 9) and the downgradient occurrence of specific VOC fingerprints via color-coded flow lines on the groundwater elevation contour figures (see Figures 11A and 11B).

- The primary VOCs on the Site are PCE (red), TCE (orange) and 1,1,1-TCA (green). Significant Dichloromethane concentrations (blue, along with other compounds) also exist in the groundwater, but this compound has a much higher solubility limit and does not appear to exist as DNAPL on the Site.

- The primary breakdown products are:

  - Cis-1,2-DCE (yellow), the primary breakdown product of both PCE and TCE, is prevalent both on and off of the Facility.

  - 1,1-DCA and 1,1-DCE (blue, along w/ other compounds), the primary breakdown products of 1,1,1-TCA, are generally confined to the Facility

  - Chloromethane, the breakdown product of Dichloromethane, is typically undetected, both on and off-Facility.

  - Other breakdown products such as Vinyl Chloride (blue, along w/ other compounds) are also found at relatively low levels on and off the Facility.

- As evident from Figure 8, groundwater flow carries primarily TCE and its primary breakdown product, cis-1,2-DCE, from the northwestern portion of the facility (location of the primary TCE DNAPL area - see Figure 9) in a southwesterly, then southerly, and finally, a southeasterly direction. This flow path is evident from monitoring wells CDW-7,[27] CDW-9, CDW-18, CDW-19 and PZ-3 (also see Figure 11C).

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[26] It is noted that additional VOCs exist in the groundwater plume such as 1,4-dioxane, acetone and trace levels of benzene, toluene, ethyl benzene and xylenes (BTEX). These compounds are not discussed directly herein given that they have no impact on the CSM or the development of the stabilization measure.

[27] It is noted that the groundwater fingerprint for CDW-7 does not show a high percentage of TCE. However, the laboratory data show that the predominant VOC in the soil is by far TCE. This discrepancy is likely due to the shallow depth of the wellscreen.

- It is noted that wells GZ-16 and PZ-2 are also within this flow path, but their VOC fingerprints are somewhat dissimilar from that expected based on the above. Both of these monitoring wells show a primarily TCE fingerprint which is missing the high proportion of cis-1,2-DCE found in the wells upgradient. This fingerprint is also seen, but to a lesser degree, at PZ-3. It is noted that a number of old partially buried 55-gallon drums unrelated to GCC were found in the vicinity of GZ-16. While the former contents of these drums are unknown,[28] they may explain this discrepancy in the model.

GZA

- Groundwater from the southwestern portion of the facility, the primary PCE DNAPL area, carries a significantly higher proportion of PCE, as expected. The downgradient flow path is generally directly to the drainage ditch to the southwest, as evident from well CDW-10.

    - A significant PCE fingerprint is exhibited by CDW-19D. This well is located on the opposite side of the drainage ditch from the PCE source area. This is not surprising given that PCE is the DNAPL which appears to have penetrated the soil profile to the greatest depth.[29] The deeper groundwater flow, originating in the PCE DNAPL area likely picks up PCE and moves initially below the ditch before "circling back," similar to the TCE migration pattern discussed above, and then migrating upward and discharging to the surface water as shown on the deep overburden groundwater elevation contour plans (See Figure 11B).

    - Well GZ-14S also shows a predominantly PCE fingerprint. However, this low level VOC contamination (18 ppb total VOCs) is likely the result of upward migration from the deeper overburden. This conclusion is based on: (1) the similar VOC fingerprints for this well and GZ-14M below (see Figure 13); (2) the lack of detection of VOCs in monitoring well CDW-11 and (3) the groundwater flow path identified on Figure 11C.

- The 1,1,1-TCA groundwater plume should generally follow the PCE plume given the locations of their respective primary source areas. This conclusion is verified by the fingerprints found in monitoring wells CDW-19D, GZ-19DD and GZ-14M, which include significant levels of 1,1,1-TCA. These wells also exhibit relatively high proportions of 1,1-DCA and 1,1-DCE.[30] However, the overall relatively low levels of 1,1,1-TCA found off Facility demonstrate that this compound is degrading substantially prior to significant off-Facility migration.

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[28] It is noted that, while relatively minor, this issue is a data gap. However, responsibility for addressing this data gap lies with others.

[29] PCE has the highest specific gravity (1.6) of the on-Site VOCs. It therefore has a greater ability to penetrate low permeability soils. PCE is therefore expected to be the more prevalent compound in the deeper flow regime, as is the case (See GZ-19DD and GZ-14M on Figure 13).

[30] 1,1-DCA and 1,1-DCE are the primary breakdown products of 1,1,1-TCA.

- The Dichloromethane groundwater plume is primarily confined to the CDW-6/CDW-12 area. This compound also degrades relatively rapidly and its high solubility appears to explain its high rate of decrease over time.

- Overall, the shallow VOC isopleths are generally consistent with the groundwater contours and, in combination, demonstrate VOC discharge into the surface water prior to the "oxbow." This conclusion is supported by the lack of significant VOC levels in all the downgradient wells (CDW-15, GZ-15, GZ-17 and GZ-18), as well as the surface water data, presented on Figure 12.

  - The groundwater contours and upward vertical gradients show migration toward, and then groundwater to surface water discharge at, the drainage ditch.

  - The volume of surface water flow in the drainage ditch increases as it approaches Course Brook, further demonstrating that it is a groundwater sink.[31]

  - Cis-1,2-DCE is the predominant VOC in the drainage ditch surface water. This surface water fingerprint is consistent with that of the groundwater proximate to the drainage ditch.

  - Surface water VOC levels do not increase downstream of the oxbow, even though the ditch is picking up additional groundwater.[32]

  - VOC levels in the groundwater below the ditch decrease from very high levels at the ditch headwaters, proximate to the Facility, to only trace levels at GZ-15, still located over 400 feet upstream of the oxbow. Chlorinated compounds were ND in the groundwater below the drainage ditch at its confluence with Course Brook (PZ-4).

  - After the initial increase in VOC levels in Course Brook at its confluence with the drainage ditch, VOC levels steadily decrease.[33] If a significant VOC plume was discharging into Course Brook, an increase in VOC levels would be expected.

  - As discussed more fully in the groundwater hydrology portion of the CSM above, Course Brook forms a "regional" sink to groundwater flow from the Site given the increasing groundwater elevations (substantially increasing surface elevation) on the other side of the brook.

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[31] These measurements were performed in the winter when the recharge to the ditch is relatively low. Greater increases would be expected in the spring.

[32] It is noted that the data provided was obtained in the winter when the ditch is generally capped with ice. The ice cap and the cold temperatures limit volatilization from the surface water.

[33] Data for the Course Brook surface water was also obtained in the winter when the brook is generally capped with ice. The ice cap and the cold temperatures limit volatilization from the surface water.

5.40.2 Deep Overburden VOC Plume

Migration of the VOC plume in the deeper overburden deposits is shown on Figure 13. As for the sand deposit, the total VOC isopleths are directly depicted and isopleths for the individual compounds are indirectly depicted via the colored "pie charts." Color-coded groundwater flow paths from the primary DNAPL areas are also shown on Figures 11B and 11D.

- It is noted that high VOC levels in the lower permeability deposits on and in the vicinity of the Facility are depicted by the total VOC isopleths, but are not evident from the "pie charts." This is due to the limited number of on-Facility monitoring wells screened specifically in the silt/silty clay deposits; wells screened in the till deposit in this area are generally clean due to the till's ability to limit VOC penetration. This is not a limitation in the data set, however, because sufficient soil data exists to demonstrate that high levels exist in the silt/silty clay deposit. This conclusion is also consistent with the downgradient groundwater data and the documented behavior of DNAPL in the subsurface.

- The salient features of this Figure are that: (1) a high percentage of PCE is typical of the deeper, low permeability deposits (as discussed above); (2) the VOC fingerprints are consistent with the deep overburden groundwater flow paths identified on Figures 11B and 11D; and (3) the lack of any significant downgradient VOCs by the time GZ-15 is reached.[34]

- The groundwater VOC data, in combination with the groundwater horizontal and vertical flow data, demonstrate that the deeper groundwater plume is discharging into the surface water in the same general fashion as is the shallower plume (refer to additional discussion for the shallow plume above).

5.40.3 Bedrock

The overall conclusion from all of the data collected to date is that Site contamination has not impacted the bedrock. This conclusion is not only supported by all of the bedrock monitoring well data, but is as would be expected based on the geologic and hydrologic information.

- The Site groundwater plume is encompassed by three bedrock monitoring wells. These wells provide direct evidence that the Site contaminants have not impacted the bedrock groundwater. The most revealing of these three wells is GZ-7R.

[34] It is noted that GZ-18M contains 39 ppb of total VOCs. The data indicate that these VOCs are not from the Site given the groundwater flow direction and the nature of the compounds found (acetone and toluene, both below drinking water standards).

- This monitoring well is located directly between the Facility and the off-Facility industrial pumping well.
- As shown by the transducer water level data over time, this well is clearly in the flow path from the Site to the industrial pumping well.
- The data obtained since GZ-7R was installed nearly two years ago has all shown the VOC levels to be ND.

- Bedrock monitoring well GZ-4 is located downgradient from the plume on the Site, if the groundwater flow direction in the bedrock is southwest as shown on Figure 11E. This well, also installed nearly two years ago, shows the level of VOCs to be ND.
- The third bedrock monitoring well, GZA-15R, is located in a direction that would have been downgradient from the Site plume prior to the groundwater flow direction reversal caused by the installation of the industrial pumping well. This well also shows the lack of Site contaminants in the bedrock[35] and demonstrates that there was no downgradient VOC plume when the groundwater flow direction was towards this well.
- For the bedrock groundwater to be impacted by the overlying contamination, one of two general migration pathways must be completed through the till, the dissolved migration pathway and/or the DNAPL pathway. These pathways are governed by very different mechanisms.
  - The DNAPL migration pathway is primarily governed by gravity forces and the surface topology and conductivity of low permeability layers. It is generally unaffected by the groundwater flow direction. A thick layer of low permeability silt and then till underlies the entire Facility. These geologic materials form a substantial barrier to downward DNAPL migration. The existing data indicate that DNAPL has not penetrated into the bedrock or the glacial till above the bedrock. The supporting data for this conclusion was previously presented in the section discussing contaminant source(s).
  - Although the vertical groundwater flow direction on the Facility is generally downward,[36] VOCs have not been detected in the bedrock wells[37]

[35] As discussed earlier, monitoring well GZA-15R did show trace levels of two VOCs; chloroform, which is not a Site COC, at 13 ppb, and toluene, below drinking water standards at 10 ppb.

[36] It is noted that the groundwater gradient is generally upward over most of the Site. The downward gradient on the Facility is likely attributable primarily to the industrial pumping well.

[37] It is noted that monitoring well GZA-15R did show trace levels of two VOCs; chloroform, at 13 ppb, which is not a Site COC and is commonly found at these levels due to "contamination" of the groundwater by infiltration of chlorinated municipal drinking water, and toluene below drinking water standards at 10 ppb.

or the on-Facility glacial till wells.[38] This is likely attributable to the large thickness and low permeability of the glacial till and silt/clayey silt deposits, as well as the VOC adsorptive capacity of these soils.

- Downgradient of the Facility, the vertical groundwater gradient is up. Therefore, dissolved VOCs can not migrate through the till and enter the bedrock in these areas.

GZA

- As described above, all of the bedrock and glacial till data show that VOCs have not contaminated the bedrock. As such, bedrock monitoring beyond the three existing wells is not required. However, an increased monitoring frequency for bedrock monitoring well GZ-7R would be prudent. As such, it is proposed that this monitoring well will be sampled during every AMP sampling round. In addition, we further propose to sample the industrial bedrock well at the car wash proximate to the Site during the next (winter) AMP sampling round.

6.00 REVISED ASSESSMENT MONITORING PROGRAM (AMP)

The AMP was originally required by DEP's April 20, 1999 Decision with Modifications and later modified by their November 2, 2000 Decision with Modifications. The intent of the AMP was to monitor groundwater quality and elevation at representative locations at the Site and to measure airborne levels of VOCs within designated residences, 91 and 91A Leland Street. The November 2, 2000 Decision with Modifications also required GCC to include, on a semi-annual basis, documentation of the operational status of the IRA crawl space venting system in the 91 Leland Street residence along with the results of the AMP. These results are published on a quarterly basis in Assessment Monitoring Reports (AMRs). Both the current and proposed AMP sampling schedule is shown on Table 8.

The current AMP does not provide for sampling of the new Supplemental Investigation monitoring wells, nor does it consider the Site contaminant distribution as further delineated in the SI. Therefore, to streamline the AMP and to include only data points that were demonstrated in Section 5.00 to be significant in tracking the migration of the plume, the following revised AMP is proposed, beginning with the spring 2002 AMP:

6.10 SAMPLING FREQUENCY

Based upon numerous quarterly groundwater monitoring events, there is no significant variation of analytical results between seasons. For this reason, GCC proposes to reduce the sampling frequency from quarterly to semi-annually. These two sampling events would take

[38] These include wells that are screened completely within the till and include GZ-1 and GZ-7. It is noted that the last sampling round yielded a total VOC value of 238 ppb in till well GZ-1. It is believed that this discrepancy is due to cross-contaminated samples. This issue will be addressed as a data gap with resolution via additional sampling and analysis conducted during the next AMP sampling round.

place during the spring and fall. These two time frames are representative of both the wet and dry seasons and therefore encompass the range of flow conditions on the Site.

6.20 SURFACE WATER SAMPLING LOCATIONS

Based upon the data collected during the SI and the upgraded CSM presented in Section 5.00 of this report, monitoring the migration of the plume should be the goal of the AMP. For that reason, the revised AMP eliminates monitoring locations within the center of the plume and focuses t on those along the edge of the plume. The plume ultimately discharges to the drainage ditch and then into Course Brook, which are the principal exposure points; surface water sampling is therefore an integral component of this program. The revised AMP proposes collection of surface water samples at the following locations:

General Site Location	Associated Surface Water Samples
Drainage Ditch	SW-10 SW-3
Confluence of Course Brook and Drainage Ditch	SW-DSC-1
Intersection MWRA Aqueduct and Course Brook	SW-USA-1 CBW-W

Samples will be analyzed for VOCs via EPA Method 8021 (including 1,4-dioxane).[39]

6.30 GROUNDWATER SAMPLING LOCATIONS

Groundwater samples will also be collected from monitoring wells at the edges of the plume to monitor potential migration of contaminants. Sampling wells located on the upgradient edge of the Facility which have consistently exhibited VOC concentrations that are either below drinking water standards or are below method detection limits do not provide additional information with respect to the CSM. Bedrock well GZ-7R is an exception. Pumping in the industrial well across Leland Street (not associated with the Site) influences water levels in GZ-7R. With pumping-induced hydraulic gradients in the area, there is a greater chance for Facility constituents to be drawn into GZ-7R. Therefore, it is proposed that this well, and its companion well GZ-7, be monitored as part of the revised AMP. Samples will be analyzed for VOCs via EPA Method 8021 (including

[39] Method 8260 is no longer required given the COCs for the Site have already all been identified. Method 8260 is only the required Method when compound identification is in question given its use of a MS detector. Groundwater, surface water and soil samples were analyzed for Extractable Petroleum Hydrocarbons/Volatile Petroleum Hydrocarbons (EPH/VPH) during the April 2001 AMP sampling round, as required by the November 2000 DEP Decision with Modifications. As described in the April 2001 AMR (GZA), petroleum hydrocarbons were not found. EPH compounds were not detected in any of the groundwater and surface water samples and VPH compounds were detected only at low levels in certain samples, due to documented Method interferences associated with the elevated levels of chlorinated VOCs on Site. Ethene was also not found above detection limits in all samples. Based on these data, EPH/VPH testing is not included in the revised AMP.

1,4-dioxane)[40]. In addition, it is proposed that the car wash well be sampled during the next (winter) AMR, pending approval of the revised AMP by DEP. This well will be analyzed for VOCs via EPA Method 8260, including 1,4-dioxane.

Sampling locations in the center of the plume yield the expected variability due to the presence of DNAPL in the subsurface upgradient of these sampling points. Sampling downgradient points on the perimeter of the plume will serve as an indicator of plume migration. Further, sampling downgradient points screened within both the sand and silt units will indicate whether vertical migration of contaminants is occurring along the plume boundary. A comprehensive round including these perimeter points would provide ample data to monitor the vertical and horizontal bounds of the contaminant plume at the Site. The following boundary monitoring points are proposed under the revised AMP:

General Location	Associated Monitoring Locations
Hydraulically upgradient of Facility (overburden)	GZ-7
Plume Perimeter-sand unit	GZ-5S GZ-16S PZ-1S and PZ-1D CDW-2 CDW-11 GZ-14S GZ-15S
Plume Perimeter-silt unit	GZ-5D GZ-16M GZ-2 GZ-15D
Vertical Plume boundary	GZ-1 GZ-7R GZ-15R

6.40 EPA APPENDIX IX ANALYSES

In addition to those wells shown above and in accordance with DEP's November 2000 Decision with Modifications, the revised AMP includes provisions for sampling select groundwater monitoring points for EPA Appendix IX analytes. Analysis of VOCs is performed under the AMP; therefore Target Compound List (TCL) VOC analyses will not be performed. TCL Semi-volatile Organic Compounds (TCL VOC), metals, cyanide and polychlorinated biphenyls (PCBs) are the Appendix IX analyses proposed for the AMP program (EPA Methods 8270, 6010, 9010 and 8080, respectively). These analytes were selected based upon previous Site usage (i.e., fuel oil storage) and the likelihood of these compounds being associated with materials previously handled at the Site. GCC has no

[40] Method 8260 is no longer required given the COCs for the Site have already all been identified. Method 8260 is only the required method when compound identification is in question given its use of a MS detector.

evidence to indicate that pesticides or herbicides were applied or handled at the Facility; therefore, they are not included in the proposed analyses.

The locations at which groundwater samples will be collected for Appendix IX analyses are monitoring wells ERM-4, CDW-5 and CDW-6. As indicated on Figure 9, these wells are associated with the three primary areas of DNAPL at the Facility. ERM-4 is located within the tetrachloroethylene DNAPL area and hydraulically downgradient of the 1,1,1-trichloroethane DNAPL area. CDW-5 is located within the trichloroethene DNAPL area and the former spill collection sump. CDW-6 is downgradient of the former still, tank and rainwater holding tank. These three points are located both in the areas of highest concentration and at the downgradient property line of the Facility, and therefore, should additional contaminants be present at the Facility, it is likely that they would be detected in groundwater from these wells.

6.50 GROUNDWATER ELEVATION MEASUREMENTS

Beginning with the spring 2002 AMP round, the following revisions to the collection of water elevation data are proposed. These changes are suggested to monitor seasonal variations in groundwater flow as well as to monitor the effect of groundwater withdrawals from the off-Site pumping well on the Site flow regime.

6.50.1 Synoptic Rounds

Four quarterly synoptic groundwater elevation rounds are proposed. These rounds will allow seasonal variations in groundwater flow to be monitored. On a semi-annual basis these data will be tabulated and reported in the AMR.

6.50.2 Automated Water Level Data Collection

As previously discussed, due to the observed influence of the pumping well on bedrock monitoring well GZ-7R, GCC proposes to implement an automated water level monitoring program for this well. A pressure transducer will be installed in the well prior to or during the spring AMP sampling event. Water levels in this well will be recorded on an hourly basis, and the data will be downloaded on a regular basis (monthly). These data will be plotted and included in the semi-annual AMR reports, as discussed in Section 6.80.

6.60 INDOOR AIR SAMPLING

GCC has collected ten rounds of indoor air samples at the 91 and 91A Leland Street residences. As documented in the November 2, 2001 report entitled "Evaluation of Critical Exposure Pathways, 91 and 91A Leland Street" (GZA, 2001), the air data indicate that concentrations of organic compounds detected in the indoor air of these residences is the result of confounding sources (sources other than groundwater). As such, a Critical Exposure Pathway (CEP) does not exist at the residences. Consequently, GCC received approval from DEP to discontinue air sampling at the residences, and therefore, an air sampling component is not included in the revised AMR.

The crawl space venting system at 91A Leland Street will remain operational until approximately May 2002, at which time the system will be shut down. An IRA closure report will be submitted for the venting system as an appendix to the fall 2002 AMR, if not submitted sooner.

6.70 FACILITY SUMP SAMPLING

DEP's Imminent Hazard Evaluation Decision with Modifications, dated July 31, 2001, required that a groundwater sample be collected quarterly from the sump in the basement of the Facility to assess seasonal variations. Additionally, the analytical results were to be incorporated into an IHE for exposure to the workers both in the basement and on the first floor of the warehouse.

As discussed in the Response to Imminent Hazard Evaluation Decision with Modifications,[41] concentrations of Site constituents can be expected to vary seasonally in the sump, with the highest concentrations observed in fall and winter. GCC will continue to collect one sample from the sump during the next two AMP sampling events (spring and fall of 2002). A sample was collected from the sump during the recent (November 2001) AMP. Therefore, one year of data (including two rounds from the fall season) will be obtained by the end of calendar year 2002, and an analysis of concentration trends will be included in the fall 2002 AMR. Following that report, no additional sump samples will be included as part of the AMP. The Imminent Hazard Evaluation required by the DEP July 31, 2001 Decision for the basement worker will be included with the spring and fall 2002 AMR.

However, as discussed in detail in GZA's November 2001 Response to the Decision, an IHE for the first floor worker is not necessary as the direction of air flow within the Facility warehouse is from the first floor to the basement. As a result, workers on the first floor could not be exposed, rendering an IHE for a warehouse first floor worker unnecessary. Therefore, an IHE for a basement worker only will be included in the spring and fall 2001 AMR.

6.80 ASSESSMENT MONITORING REPORTS (AMRS)

The data collected during the revised AMP will be documented in semi-annual AMRs. These reports will be submitted no later than 60 days after collection of the groundwater samples. The AMR will be prepared in accordance with the DEP April 1999, November 2000 and July 2001 Decisions with Modifications, except as discussed in the previous sections.

[41] Letter to Mr. Jeffrey Chormann, DEP, from GZA, dated August 21, 2001.

7.00 DATA GAP IDENTIFICATION AND RESOLUTION

7.10 BEDROCK GROUNDWATER FLOW

To further assess groundwater flow in bedrock due to the industrial pumping well located at the car wash on Leland Street, a transducer will be placed into bedrock monitoring well GZ-7R for a period of one year. The transducer will record water levels hourly and the data will be downloaded once a month for the year-long monitoring period. It is planned that the transducer will be installed this winter, assuming DEP approval of this section of the SAP. Additionally, GCC is currently in the process of attempting to obtain the installation log for this for this well to verify that it is, in fact, a bedrock well, along with pumping data including flow rates, pumping frequency and drawdown.

It is also proposed that the monitoring frequency for bedrock monitoring well GZ-7R be increased to demonstrate that the bedrock remains uncontaminated. This well will now be sampled during every AMP sampling round. In addition, it is further proposed that the industrial bedrock well proximate to the Site (car wash) be sampled during the next (winter) AMP sampling round. The sample will be analyzed using Method 8260.

7.20 PRESENCE OF DNAPL OFF-FACILITY

Concurrent with treatment system construction, selected extraction well borings will be continuously sampled to the top of the till to further investigate if DNAPL exists off Facility. Soil headspace measurements will be taken at each interval and key samples will be submitted for Method 8260 analysis. Sudan dye tests will also be performed as appropriate. This work will be commenced after the stabilization plan is approved.

7.20.1 GZ-1

Low levels of VOCs were detected for the first time in monitoring well GZ-1 during the April 2001 AMP. It is believed that these levels were likely due to cross-contamination. This conclusion is based on the lack of VOCs in the till during installation of the well in this unit. VOCs were analyzed in both the soil and the groundwater. This issue will be reassessed after the next round of AMP data has been obtained.[42]

7.20.2 Drums

Drums of unknown origin and former content are located proximate to GZA-16 on the condominium property. These drums are not related to GCC and therefore, the responsibility for addressing this data gap lies with others.

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[42] GZA sampled GZ-1 during the November 2001 AMP and is currently awaiting receipt of the data.

7.30 GROUNDWATER FLOW/IMPACT TO THE WETLANDS

To further assess effects of groundwater extraction on the wetlands, it is proposed that three miniwell couplets be installed with an all-terrain vehicle (ATV)-mounted vibratory hammer. These couplets would be located proximate to SW-1, SW-10 and the southwest corner of the Kinnarney property. Installation should take place in late winter after the ground has frozen and the 91 Leland Street residence has been vacated, providing easier access and limited disturbance to the wetlands. This installation schedule is also predicated on DEP concurrence and Conservation Commission approval.

Given the recent installation of a number of new monitoring wells as part of this SAP, the data does not yet exist to provide a complete set of quarterly groundwater elevation contours. As such, future quarterly gauging rounds will include all wells, piezometers and surface water locations, so as to provide a more comprehensive set of seasonal contours. These data will be provided in the AMRs.

8.00 COMPREHENSIVE ASSESSMENT REPORT II (CARP II)

As detailed in DEP's April 20, 1999 and November 2, 2000 Decisions with Modifications, a scope of work and schedule for the completion of the CARP II is provided in this section. The CARP II will be submitted following the installation of the Stabilization Measure extraction wells, at which time the data gaps identified in Section 7.00 that require additional field investigation will have been addressed. In addition, based upon the results of these field investigations, a sampling plan designed to further demonstrate that natural attenuation of Site constituents is occurring will be designed and submitted in the CARP II.

8.10 SCOPE OF WORK

The CARP II will incorporate the findings of the Supplemental Investigation and the subsequent updates to the CSM with the CARP (CDW, 1997) and the Interim CARP II (GZA, 2000). The report will contain the revised sections on Site history and background, previous investigation results (including the SI and the Stabilization Measure field programs), Site hydrogeology, and fate and transport of constituents of concern at the Site. Per the DEP's April 1999 Decision, the CARP II will also include a scope of work and schedule for implementation of the human health and ecological risk assessments as well as a geochemical sampling plan for further demonstration of natural attenuation. The report will be prepared in compliance with Section B(6)f of the GCC's Hazardous Waste License and 310 CMR 40.0113.

8.20 SCHEDULE

The CARP II shall be submitted to DEP no later than 150 days following the completion of the installation of the additional Stabilization Measure extraction wells (as discussed in the Stabilization Measure Plan, GZA, 2001). Additional field investigations required to address the data gaps that were identified in Section 7.00 of this SAP report will be performed concurrently with the installation of the Stabilization Measure extraction wells.

9.00 CONCLUSIONS

- The Supplemental Investigation has provided additional data which has allowed further evaluation of the CSM. Overall, these new data have not required a substantial modification to the CSM. Rather, the data have been used to refine the Model. The one major exception is the identification of an industrial bedrock pumping well proximate to the Facility. This well has reversed the groundwater flow direction in the bedrock relative to that anticipated previously. The bedrock flow direction now appears to be to the northwest (towards GZ-7R) rather than in the direction of the overburden groundwater flow, to the southeast toward GZ- 15R. Further confirmation of this conclusion will be provided via continuous monitoring of the groundwater elevations in GZ-7R.

- Additional investigations were performed to verify the existence of a groundwater divide in the overburden along Leland Street. This divide was further confirmed by the new data and continues to be evident in all of the monitoring rounds conducted to date, and is consistent with the GIS mapping and surface topography.

- Monitoring wells GZ-15S, GZ-15D, GZ-15R, GZ-17s, GZ-17M, GZ-18S and GZ-18M were installed at the downgradient boundary of the Site to confirm the terminus of the plume. These wells, along with previously existing wells CDW-15, PZ-4S and PZ-4D, the ditch sediment data, the surface water data, the horizontal and vertical gradient data, the geologic data and the ground surface topography, demonstrate that the plume fully discharges to the surface water prior to this semi-circle of borings. The downgradient Site groundwater boundary has therefore conservatively been established at the oxbow in the surface water drainage ditch, over 400 feet further downgradient. These data further show that Course Brook forms a more regional groundwater sink (relative to the drainage ditch) which additionally prevents groundwater from traversing the Brook into Sherborn.

- In August 2001, GZA performed an ecological characterization of the wetlands across the Site including the confluence of the surface water drainage ditch with Course Brook. This study was supplemental to GZA's February 2001 Imminent Hazard Evaluation (IHE). The conclusions of the August study, which were documented in a report to DEP on October 10, 2001, concur with those presented in February—No Imminent Hazard to ecological receptors in Site wetlands exists.

- A thick layer of low permeability silt and then glacial till underlies the entire Facility where DNAPL has been identified. These geologic materials form a substantial barrier to downward migration of DNAPL and dissolved phase VOCs. All of the existing geologic data, along with the hydrologic and geochemical monitoring data indicate that DNAPL has not penetrated glacial till, and therefore confirms the bedrock data which indicate Site VOCs have not impacted the bedrock groundwater. The additional bedrock data, including rock cores, fracture trace analysis and lineament analysis, demonstrate that the bedrock across the Site all belongs to the same formation and no significant impacts to the CSM were identified due to an unconfirmed fault which may existed based on the bedrock geology map. Further confirmation of the above will be provided prior to submittal of the CARP II via additional soil and groundwater data from the proposed stabilization measure extraction wells and monitoring of downgradient bedrock well GZ-7R and the industrial bedrock well.

- A pumping test was conducted in the newly installed extraction well, EW-1, for design of the stabilization measure. This work demonstrated that the maximum steady state pumping rate for the well was between 14 and 16 GPM. The test further shows that the capture zone established by this well extends for approximately 50 feet on each side of the well in the upper sand deposits. The capture zone expands to as much as 100 feet on each side of the well in the lower, stratified silt/sand deposits.

- An evaluation of the potential for a Critical Exposure Pathway (CEP) to have existed at the 91 Leland Street residence was completed. This work, which entailed ten indoor and outdoor air sampling events coordinated with sampling of the groundwater proximal to the residence, found that a CEP did not, and currently does not exist. These results were submitted to DEP on November 2, 2001. As such, the crawl space venting can be terminated and a completion report submitted to close out the IRA.

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TABLES

TABLE 1

Volatile Organic Compounds in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Field Identification Sampling Date Collection Method Sample Depth (ft)		GZ-13 (S-4) 3/20/01 Split Spoon 6'-8'	GZ-14M (S-17) 3/26/01 Split Spoon 69'-71'	GZ-14M (S-18B) 3/26/01 Split Spoon 74.5'-76.5'	GZ-14M (S-19) 3/26/01 Split Spoon 77-79	GZ-16M (S-5) 3/29/01 Split Spoon 8'-10'	GZ-16M (S-11) 3/30/01 Split Spoon 39'-41'
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	µg/kg	<100	<100	<100	<100	<100	<100
1,1,1-Trichloroethane	µg/kg	140	<100	<100	<100	<100	<100
1,1-Dichloroethane	µg/kg	<100	<100	<100	<100	<100	<100
1,1-Dichloroethene	µg/kg	<100	<100	<100	<100	<100	<100
1,2,4-Trimethylbenzene	µg/kg	<100	<100	<100	<100	<100	<100
cis-1,2-Dichloroethene	µg/kg	490	<100	<100	<100	<100	<100
Dichloromethane	µg/kg	<100	<100	<100	<100	<100	<100
Naphthalene	µg/kg	<100	<100	<100	<100	<100	<100
Tetrachloroethene	µg/kg	<100	280	90	<100	<100	<100
Trichloroethene	µg/kg	<100	81	<100	<100	<100	<100
Percent Solids	%	81.9	86.4	88.1	88.6	77.8	83.1

NOTES:

1. Samples analyzed for VOC by EPA Method 8260B.
2. Refer to Appendix F for corresponding laboratory reports and trip blank analyses.
3. J = Estimated.

TABLE 1

Volatile Organic Compounds in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Field Identification Sampling Date Collection Method Sample Depth (ft)	GZ-16M (S-14) 3/30/01 Split Spoon 50'-52'	GZ-17M (S-6) 4/3/01 Split Spoon 14'-16	GZ-17M (S-12) 4/3/01 Split Spoon 44'-46'	GZ-17M (S-13) 4/3/01 Split Spoon 49'-51'	GZ-18M (S-5) 4/5/01 Split Spoon 8'-10'	GZ-18M (S-11) 4/5/01 Split Spoon 39'-41'
Analyte	**Units**						
1,1,1,2-Tetrachloroethane	μg/kg	<100	<100	<100	<100	<100	<100
1,1,1-Trichloroethane	μg/kg	<100	<100	<100	<100	<100	<100
1,1-Dichloroethane	μg/kg	<100	<100	<100	<100	<100	<100
1,1-Dichloroethene	μg/kg	<100	<100	<100	<100	<100	<100
1,2,4-Trimethylbenzene	μg/kg	<100	<100	<100	<100	<100	<100
cis-1,2-Dichloroethene	μg/kg	<100	<100	<100	<100	<100	<100
Dichloromethane	μg/kg	<100	<100	<100	<100	<100	<100
Naphthalene	μg/kg	<100	<100	330	<100	<100	<100
Tetrachloroethene	μg/kg	<100	<100	<100	<100	<100	<100
Trichloroethene	μg/kg	<100	<100	<100	<100	<100	<100
Percent Solids	%	85.9	76	75.3	89.7	85.3	77.4

NOTES:

1. Samples analyzed for VOC by EPA Method 8260B.
2. Refer to Appendix F for corresponding laboratory reports and trip blank analyses.
3. J = Estimated.

TABLE 1

Volatile Organic Compounds in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Field Identification	GZ-18M (S-12A)	GZ-15R (S-10)	GZ-15R (S-12)	GZ-19DD (S-6)	GZ-19DD (S-8)
	Sampling Date	4/5/01	4/5/01	4/5/01	4/20/01	4/20/01
	Collection Method	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon
	Sample Depth (ft)	45.5'-46.41'	35.5'-37.5'	42'44'	18'-20'	26.5'-28.5'
Analyte	**Units**					
1,1,1,2-Tetrachloroethane	μg/kg	<100	<100	<100	<100	<100
1,1,1-Trichloroethane	μg/kg	<100	<100	<100	<100	<100
1,1-Dichloroethane	μg/kg	<100	<100	<100	120	190
1,1-Dichloroethene	μg/kg	<100	<100	<100	100	<100
1,2,4-Trimethylbenzene	μg/kg	<100	<100	<100	<100	<100
cis-1,2-Dichloroethene	μg/kg	<100	<100	<100	560	100
Dichloromethane	μg/kg	<100	<100	<100	<100	<100
Naphthalene	μg/kg	<100	<100	<100	<100	<100
Tetrachloroethene	μg/kg	<100	<100	<100	9900	7700
Trichloroethene	μg/kg	<100	<100	<100	1600	1100
Percent Solids	%	89.2	89	90.6	76.8	75.8

NOTES:
1. Samples analyzed for VOC by EPA Method 8260B.
2. Refer to Appendix F for corresponding laboratory reports and trip blank analyses.
3. J = Estimated.

TABLE 1
Volatile Organic Compounds in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Field Identification Sampling Date Collection Method Sample Depth (ft)	GZ-19DD (S-12) 4/23/01 Split Spoon 42'-44'	EW-1 (S-6) 4/27/01 Split Spoon 10'-12'	EW-1 (S-10) 3/20/01 Split Spoon 18'-20'	EW-1 (S-15) 5/1/01 Split Spoon 28'-30'	EW-1 (S-27) 5/1/01 Split Spoon 52'54'
Analyte	**Units**					
1,1,1,2-Tetrachloroethane	μg/kg	<100	<100	<100	<100	<100
1,1,1-Trichloroethane	μg/kg	1200	140	1400	3900	<100
1,1-Dichloroethane	μg/kg	430	<100	200	<100	<100
1,1-Dichloroethene	μg/kg	470	<100	100	230	<100
1,2,4-Trimethylbenzene	μg/kg	<100	130	<100	<100	<100
cis-1,2-Dichloroethene	μg/kg	540	200	1000	470	<100
Dichloromethane	μg/kg	1200	<100	490	<100	<100
Naphthalene	μg/kg	<100	<100	<100	<100	<100
Tetrachloroethene	μg/kg	16000	140	2000	4200	<100
Trichloroethene	μg/kg	4800	<100	600	3200	<100
Percent Solids	%	82	84.6	80.7	75.3	88.6

NOTES:
1. Samples analyzed for VOC by EPA Method 8260B.
2. Refer to Appendix F for corresponding laboratory reports and trip blank analyses.
3. J = Estimated.

TABLE 2
Extractable and Volatile Petroleum Hydrocarbons in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Field Identification	EW-1 (S-6)	EW-1 (S-10)	EW-1 (S-15)	EW-1 (S-27)
Sampling Date	4/27/01	4/27/01	5/1/01	5/1/01
Collection Method	Split Spoon	Split Spoon	Split Spoon	Split Spoon
Sample Depth (ft)	10'-12'	18'-20'	28'-30'	52'-54'
Analyte	**Concentration (mg/kg)**			
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)				
C9-C18 Aliphatic Fraction	4	<2.0	<2.0	<2.0
C19-C36 Aliphatic Fraction	14	<2.0	<2.0	<2.0
C11-C22 Aromatics	2.9	<2.0	<2.0	<2.0
TARGETED PAH ANALYTES				
Naphthalene (Diesel PAH)	<0.30	<0.30	<0.30	<0.30
2-Methylnaphthalene (Diesel PAH)	<0.30	<0.30	<0.30	<0.30
Acenaphthylene (Diesel PAH)	<0.30	<0.30	<0.30	<0.30
Acenaphthene (Diesel PAH)	<0.30	<0.30	<0.30	<0.30
Fluorene	<0.30	<0.30	<0.30	<0.30
Phenanthrene (Diesel PAH)	<0.30	<0.30	<0.30	<0.30
Anthracene	<0.30	<0.30	<0.30	<0.30
Fluoranthene	<0.30	<0.30	<0.30	<0.30
Pyrene	<0.30	<0.30	<0.30	<0.30
Benzo [a] Anthracene	<0.30	<0.30	<0.30	<0.30
Chrysene	<0.30	<0.30	<0.30	<0.30
Benzo [b] Fluoranthene	<0.30	<0.30	<0.30	<0.30
Benzo [k] Fluoranthene	<0.30	<0.30	<0.30	<0.30
Benzo [a] Pyrene	<0.30	<0.30	<0.30	<0.30
Indeno [1,2,3-cd] Pyrene	<0.30	<0.30	<0.30	<0.30
Dibenzo [a,h] Anthracene	<0.30	<0.30	<0.30	<0.30
Benzo [g,h,i] Perylene	<0.30	<0.30	<0.30	<0.30
VOLATILE PETROLEUM HYDROCARBONS (VPH)				
C5-C8 Aliphatics	3.1	0.85*	5.3*	<0.50
C9-C12 Aliphatics	35	1.1	<0.50	<0.50
C9-C10 Aromatics	16	0.62	<0.50	<0.50
TARGETED VPH ANALYTES				
Methyl-Tert Butyl-Ether	n/a	n/a	n/a	<0.25
Benzene	n/a	n/a	n/a	<0.050
Toluene	n/a	n/a	n/a	<0.050
Ethylbenzene	n/a	n/a	n/a	<0.050
m&p-Xylene	n/a	n/a	n/a	<0.050
o-Xylene	n/a	n/a	n/a	<0.050
Naphthalene	n/a	n/a	n/a	<0.10

Notes:
1. * indicates fraction C5-C8 aliphatics contains volatile compounds not associated with petroleum.
2. Refer to Appendix F for corresponding laboratory reports.
3. n/a = not analyzed.

TABLE 3

Total Organic Carbon (TOC) in Subsurface Soil
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Sample ID	Sampling Date	Sampling Depth (feet below ground surface)	Sample Lithology	Total Organic Carbon (%)
EW-1 (S-5)	4/26/01	8'-10'	sand	0.084
EW-1 (S-18)	4/30/01	34'-36'	silty sand	0.012
GZ-14M (S-10)	3/21/01	34'-36'	silty sand	0.027
GZ-14M (S-16)	3/23/01	64'-66'	sand	0.023
GZ-14M (S-19)	3/26/01	77'-78.25'	till	0.034
GZ-15R (S-4)	4/10/01	6.5'-8.5'	sand	0.131
GZ-15R (S-9)	4/10/01	30'-32'	clay and silt	0.064
GZ-15R (S-12)	4/10/01	40'-42'	till	0.128
GZ-17M (S-3)	4/3/01	4'-6'	silty sand	0.41
GZ-17M (S-8)	4/3/01	24'-26'	clayey silt	0.078
GZ-17M (S-13)	4/3/01	49'-51'	till	0.076
GZ-19DD (S-6)	4/20/01	18'-20'	silt and clay	0.053

Note: Refer to Appendix F for corresponding laboratory reports.

TABLE 4
Screen Interval and Measuring Point Elevations
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Monitoring Point	Top of Well Screen (feet below ground surface)	Bottom of Well Screen (feet below ground surface)	Total Boring Depth	Screened Lithology	Measuring Point Elevation
Monitoring Wells					
CDW-1	5	15.0	17.0	sand and gravel	159.59
CDW-2	3	13.0	13.0	sand	157.21
CDW-3	4	14.0	15.0	sand	157.65
CDW-4	1.5	6.5	6.5	silt & sand/sand	158.21
CDW-5	1.75	11.8	15.0	silt & sand/gravel	158.93
CDW-6	2.0	10.8	12.0	sand	157.07
CDW-7	0.5	10.5	10.5	sand	158.42
CDW-8	28	38.0	41.0	sand & silt/silt	NA
CDW-9	2	12.0	12.0	sand, silt	155.25
CDW-10	2	12.0	12.0	sand/silt & sand	153.12
CDW-11	2	12.0	12.0	sand & gravel/sand	152.99
CDW-12	10	20.0	22.0	silt	154.20
CDW-13	5	15.0	15.0	sand and silt	161.15
CDW-14	2	12.0	12.0	sand & silt/sand	158.10
CDW-15	2	12.0	15.0	sand & gravel/sand	154.62
CDW-16	3	13.0	15.0	sand & silt/sand	NA
CDW-17	3	13.0	15.0	sand	160.03
CDW-18S	1	6.0	6.0	sand	153.57
CDW-18D	4	9.0	20.0	sand	153.78
CDW-19S	1	6.0	6.0	sand	152.63
CDW-19D	15	20.0	30.0	sand	154.91
ERM-2	4.0	14.0	17.0	sand	NA
ERM-3	4.0	14.0	17.0	sand	NA
ERM-4	3.0	13.0	17.0	sand	159.53
ERM-11	4.0	14.0	17.0	sand & gravel/sand & silt	161.17
ERM-12S	3.5	13.5	15.0	NA	160.83
ERM-12D	38.0	43.0	47.0	Silt	160.32
MW-1	NA	15.0	17.0	sand and gravel	159.88
MW-2	NA	13.0	13.0	sand	160.00

TABLE 4
Screen Interval and Measuring Point Elevations
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Monitoring Point	Top of Well Screen (feet below ground surface)	Bottom of Well Screen (feet below ground surface)	Total Boring Depth	Screened Lithology	Measuring Point Elevation
MW-3	NA	13.0	13.0	sand	NA
MW-4	NA	17.0	17.0	sand & gravel/sand	160.90
MW-5	NA	20.0	22.0	sand	NA
GZ-1	65	70.0	71.0	till	159.66
GZ-2	62	67.0	69.0	silt/till	161.18
GZ-3	47	54.0	54.0	sand	160.21
GZ-4	25	35.0	39.0	sand	158.84
GZ-4R	47	63.0	63.0	bedrock	158.65
GZ-5S	2.5	17.5	18.0	sand/silt	156.12
GZ-5D	34	44.0	44.0	till	156.07
GZ-6	5	20.0	22.0	sand	165.42
GZ-7	38	43.0	43.0	till	161.40
GZ-7R	81	96.0	97.0	bedrock	161.74
GZA-13	1.5	11.5	14.0	Sand	159.75
GZA-14S	14.8	24.8	25.3	Sand	155.35
GZA-14M	67	77.0	79.0	Sand	155.35
GZA-15S	4	14.0	14.0	Sand	156.47
GZA-15D	19	34.0	34.0	Silt	156.68
GZA-15R	48	53.0	53.0	Bedrock	156.51
GZA-16S	2	12.0	12.0	Sand	158.54
GZA-16M	40	50.0	51.4	Silt	158.77
GZA-17S	4	14.0	14.0	Sand	158.18
GZA-17M	40	50.0	51.0	Silt	158.06
GZA-18S	4	14.0	14.0	Sand	158.35
GZA-18M	35.5	45.5	46.4	Silt	158.31
GZA-19DD	38	48.0	54.0	Silt	154.15
EW-1	8.13	45.1	46.9	Sand and Silt	159.07 [2]
EW-PZ-1	25	45.0	45.0	Silt	156.85
EW-PZ-2S	3	18.0	18.0	Sand	158.52
EW-PZ-2D	23	38.0	43.0	Silt	158.37

TABLE 4
Screen Interval and Measuring Point Elevations
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Monitoring Point	Top of Well Screen	Bottom of Well Screen	Total Boring Depth	Screened Lithology	Measuring Point Elevation
	(feet below ground surface)				
Mini Wells/Piezometers					
GZ-8	2	12.0	12.0	silty sand	158.72
GZ-9	1	11.0	11.0	silty sand	158.71
GZ-10	1	11.0	11.0	silty sand	158.84
GZ-11	1	11.0	11.0	silty sand	158.94
GZ-12	1	11.0	11.0	silty sand	159.85
PZ-1S	7	9.0	9.0	sand	153.03
PZ-1D	16	18.0	18.0	silty sand	154.34
PZ-2S	7	9.0	9.0	sand	154.29
PZ-2D	16	18.0	18.0	silty sand	154.72
PZ-3S	8	10.0	10.0	sand	154.02
PZ-3D	18.5	20.5	20.5	silty sand	154.06
PZ-4S	7	9.0	9.0	sand	103.18
PZ-4D	16	18.0	18.0	silty sand	103.37
FW-A	NA	15.1	NA	NA	NA
FW-17	NA	15.8	NA	NA	NA

Notes:

1. Measuring Point Elevation is the top of PVC.
2. Measuring Point Elevation is the top of steel casing.
3. NA = Not Available

TABLE 5
Volatile Organic Compounds (VOCs) in Groundwater
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Monitoring Wells													Moores Sump	Trip Blanks		
Sample Identification	GZ-13	GZ-14S	GZ-14M	GZ-15S	GZ-15D	GZ-15R	GZ-16S	GZ-16M	GZ-17S	GZ-17M	GZ-18S	GZ-18M	GZ-19DD	MSUMP	TB-042601	TB-042701	TB-050401
Date Sampled	4/26/01	4/19/01	4/19/01	4/27/01	4/27/01	4/27/01	5/4/01	5/4/01	5/4/01	5/4/01	4/27/01	4/27/01	5/4/01	4/5/01	4/26/01	4/27/01	5/4/01
Analyte (µg/L)																	
1,1-Dichloroethene	< 100	< 1.0	270	< 1.0	< 1.0	< 1.0	1.5	<2.0	<2.0	<2.0	< 1.0	< 1.0	3,800	2.0	< 1.0	< 1.0	<1.0
Dichloromethane	< 100	< 1.0	< 10.0	< 1.0	1.1	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	8,200	< 1.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethane	1,200	< 1.0	250	1.8	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	1,600	1.3	< 1.0	< 1.0	<1.0
cis-1,2-Dichloroethene	17,000	< 1.0	17 J	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	5,500	10	< 1.0	< 1.0	<1.0
Chloroform	< 100	< 1.0	< 10.0	2.0	1.4	13	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	<10	< 1.0	< 1.0	< 1.0	<1.0
1,1,1-Trichloroethane	4,400	2.6	240	2.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	14,000	7.9	< 1.0	< 1.0	<1.0
Benzene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	10	< 1.0	< 1.0	< 1.0	<1.0
Trichloroethene	130	7.1	2400	< 1.0	< 1.0	< 1.0	9.7	<2.0	<2.0	<2.0	< 1.0	< 1.0	23,000	30	< 1.0	< 1.0	<1.0
Toluene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	9.4	<1.0	<2.0	<2.0	<2.0	< 1.0	9.9	90	< 1.0	< 1.0	< 1.0	<1.0
Tetrachloroethene	450	6.0	4800	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	49,000	4.7	< 1.0	< 1.0	<1.0
Ethylbenzene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	15	< 1.0	< 1.0	< 1.0	<1.0
m&p-Xylene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	<10	< 1.0	< 1.0	< 1.0	<1.0
o-Xylene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	20	< 1.0	< 1.0	< 1.0	<1.0
Naphthalene	< 100	2.7	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	18	< 1.0	< 1.0	< 1.0	<1.5
Acetone	< 2500	< 25.0	< 250.0	< 25	< 25	< 25	<25	<50	<50	<50	< 25	29	1,400	< 25	< 25	< 25	<25
1,2,4-Trimethylbenzene	< 100	< 1.0	< 10.0	< 1.0	< 1.0	< 1.0	<1.0	<2.0	<2.0	<2.0	< 1.0	< 1.0	24	< 1.0	< 1.0	< 1.0	<1.0
Total Volatile Organic Compounds (VOC) (1)	23,180	18	7,960	5.8	2.5	22	11	BMQL	BMQL	BMQL	BMQL	39	106,677	56	BMQL	BMQL	BMQL

Notes:
1. Samples analyzed for VOC by EPA method 8260B.
2. Total VOC concentration calculated as the sum of all analytes detected above instrument detection limit.
3. Only those compounds that exceed detection limits are shown.
4. Refer to Appendix G for corresponding laboratory reports.
5. J = concentration estimated due to presence of non-target analyte.
6. BMQL = below laboratory method quantitation limit.

TABLE 6

HISTORICAL GROUNDWATER ELEVATIONS (feet)
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Monitoring Point	June-99	September-99	January-00	April-00	July-00	October-00	December-00	April-01	July-01
CDW-1	155.81	152.75	NM	NM	NM	154.63	154.80	156.5	155.45
CDW-2	154.35	151.88	153.43	154.95	152.49	153.41	153.35	155.21	153.01
CDW-3	152.42	151.82	152.93	153.77	152.64	152.05	152.13	154.17	153.47
CDW-4	154.14	151.41	152.61	153.29	152.3	152.34	153.41	153.59	152.89
CDW-5	152.36	152.44	154.51	156.79	154.09	154.09	154.84	155.67	154.6
CDW-6	152.94	150.87	152.45	153.22	152.08	152.18	152.92	153.19	NM
CDW-7	155.31	153.13	154.4	NM	NM	154.29	154.90	156.31	155.12
CDW-9	152.76	149.57	152.06	153.15	151.35	151.2	152.70	153.07	152.42
CDW-10	151.69	149.34	151.18	151.64	150.63	150.86	150.67	151.47	151.15
CDW-11	152.5	150.2	152.09	152.41	151.42	151.39	152.06	152.29	152.04
CDW-12	152.55	150.39	151.79	152.53	151.4	151.5	152.16	152.52	151.62
CDW-13	NM	149.85	NM	152.11	151.25	150.98	NM	152.65	151.48
CDW-14	153.01	151.6	152.45	155.38	151.59	151.85	152.05	153.21	152.7
CDW-15	150.69	149.32	150.85	151.01	149.61	150.52	150.57	150.82	150.55
CDW-17	NM	154.444	154.78	156.48	155.48	154.63	154.68	157.06	155.75
CDW-18S	151.48	150.04	151.46	151.91	151.16	150.82	151.59	151.79	151.41
CDW-18D	151.61	150.44	151.83	152.27	151.53	151.39	151.18	152.17	151.39
CDW-19S	*151.54*	*150.32*	151.69	151.82	151.28	146.87	NM	151.81	151.63
CDW-19D	151.36	149.97	151.27	151.46	150.97	150.9	151.17	151.39	151.15
GZ-1	NM	NM	NM	154.6	153.97	153.12	147.96	150.68	NM
GZ-2	NM	NM	153.3	154.54	154.07	153.38	154.84	151.38	151.76
GZ-3	NM	NM	154.77	156.3	155.61	154.35	155.06	157.53	155.88
GZ-4	NM	NM	151.5	151.82	150.03	150.99	149.09	150.84	152.47
GZ-4R	NM	NM	151.09	151.5	150.61	150.54	149.68	150.14	150.94
GZ-5S	NM	NM	152.51	153.61	152.35	152.01	153.05	153.87	152.86
GZ-5D	NM	NM	152.72	153.75	152.42	152.22	153.02	152.15	152.99
GZ-6	NM	NM	154.83	156.24	155.7	154.29	155.10	157.42	155.86
GZ-7	NM	NM	155.02	156.47	155.75	154.78	155.27	157.48	156.15
GZ-7R	NM	NM	149.15	154.38	151.54	152.23	144.60	147.59	152.25
GZ-8	NM	NM	154.72	156.68	155.63	154.82	155.29	157.39	156.31
GZ-9	NM	NM	154.69	156.98	155.6	154.82	155.33	157.2	156.07
GZ-10	NM	NM	154.29	157.03	155.55	154.84	155.42	156.99	155.79
GZ-11	NM	NM	154.34	157.26	155.29	155.13	155.41	157.01	155.89
GZ-12	NM	NM	NM	156.91	154.93	155.71	156.80	NM	NM
GZA 13	NM	NM	NM	NM	NM	NM	NM	157.05	156.24
GZA 14S	NM	NM	NM	NM	NM	NM	NM	151.9	151.64
GZA 14M	NM	NM	NM	NM	NM	NM	NM	152.01	151.45
GZA 15S	NM	NM	NM	NM	NM	NM	NM	150.38	150.24
GZA 15D	NM	NM	NM	NM	NM	NM	NM	151.79	151.22
GZA 15R	NM	NM	NM	NM	NM	NM	NM	151.99	151.31
GZA 16S	NM	NM	NM	NM	NM	NM	NM	152.45	151.62
GZA 16M	NM	NM	NM	NM	NM	NM	NM	152.42	151.72
GZA 17S	NM	NM	NM	NM	NM	NM	NM	151.29	151.1
GZA 17M	NM	NM	NM	NM	NM	NM	NM	152.55	151.93
GZA 18S	NM	NM	NM	NM	NM	NM	NM	152.66	152.06
GZA 18M	NM	NM	NM	NM	NM	NM	NM	154.97	153.91
GZA 19DD	NM	NM	NM	NM	NM	NM	NM	152.55	152.63
EW-1	NM	NM	NM	NM	NM	NM	NM	NM	153.07
EW-PZ-1	NM	NM	NM	NM	NM	NM	NM	NM	153.72
EW-PZ-2S	NM	NM	NM	NM	NM	NM	NM	NM	152.94
EW-PZ-2D	NM	NM	NM	NM	NM	NM	NM	NM	153.99
PZ-1S	NM	NM	NM	151.29	150.57	150.7	**151.26**	151.28	151.08
PZ-1D	NM	NM	NM	151.47	150.78	149.97	**151.56**	151.44	151.07
PZ-2S	NM	NM	NM	151.52	150.63	150.68	151.07	151.84	151.33
PZ-2D	NM	NM	NM	151.34	150.74	148.96	148.92	149.29	151.48
PZ-3S	NM	NM	149.99	150.14	149.58	149.84	150.04	150.3	150.5
PZ-3D	NM	NM	151.02	151.07	150.49	150.57	151.17	151.21	151.15
SW-PZ3	NM	NM	NM	NM	NM	150.42	150.32	150.28	150.28
PZ-4S	NM	NM	99.46	99.74	98.41	99.02	98.99	99.37	99.02
PZ-4D	NM	NM	93.57	99.8	98.75	99.16	**100.37**	99.89	98.18
FW-A	NM	NM	NA	NA	NA	NA	NA	NA	NA
FW-17	NM	NM	NA	NA	NA	NA	NA	NA	NA
SW-1	NM	NM	151.89	151.88	NM	NM	151.93	151.82	DRY
SW-2	**NM**	**NM**	NM	NM	NM	NM	**NM**	**NM**	NM
SW-3	NM	NM	151.13	150.78	NM	NM	150.21	150.12	150
SW-4	NM	NM	NM	NM	NM	NM	NM	NM	NM
SW-10	NM	NM	150.44	150.82	150.75	150.73	150.69	150.96	150.87
ERM-4	155.25	154.16	NM	155.66	154.82	153.68	154.35	NM	NM
ERM-11	NM	NM	NM	156.74	156.23	155	155.39	157.87	156.47
ERM-12D	155.87	152.87	154.65	156.05	155.44	154.3	154.95	157.08	155.69
MW-1	NM	NM	NM	155.35	NM	NM	NM	NM	NM
MW-2	NM	NM	NM	155.46	154	153.7	154.83	155.3	154.73
MW-4	NM	NM	NM	156.16	154.86	154.21	155.33	156.71	155.69

Notes:

1. Elevations shown for PZ-4S and PZ-4D are relative to an arbritrary benchmark of 100 fett.
2. **BOLD** indicates that the elevation shown is the elevation of an obstruction (probably ice) encountered during the winter round.
3. New wells were gauged in the weeks following the AMP (4/26/01-5/04/01).
4. "NM" means that the well was not gauged.
5. "NA" means that the well was gauged but the elevation data is not available because that point has not been surveyed in.

TABLE 7

HISTORICAL CONSTITUENTS OF CONCERN IN GROUNDWATER

Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Sampling Date	Sampling Method	Tetrachloroethylene	Trichloroethylene	cis-1,2-Dichloroethylene	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethane	1,4-Dioxane	Acetone	Dichloromethane
CDW-1	Dec-96	Bailer	2,000	2,800	920	<100	2,900	<100	NA	NA	<250
	Jan-97	Bailer	48,000	54,000	14,000	<200	101,000	880	NA	NA	<500
	Jan-00	Bailer	6,900	16,000	13,000	<2000	49,000	<1000	NA	<25000	2,200
	Jul-00	Pump	28,000	29,000	19,000	<1000	83,000	1000	NA	<13000	1,300
CDW-2	Jan-97	Bailer	2,700	490	560	<50	680	<50	NA	NA	<125
	Jun-99	Bailer	602	496	812	8.6	600	46	NA	< 5.0	< 2.0
	Jan-00	Pump	350	310	460	<5.0	280	28	NA	<63	<2.5
	Jul-00	Pump	540	700	790	<20	640	30	NA	<250	190
CDW-3	Jan-97	Bailer	31,300	4,000	7,200	<100	17,000	260	NA	NA	<250
	Feb-00	Bailer	20,000	5,300	7,700	<200	11,000	200	NA	<2500	<100
CDW-4	Jan-97	Bailer	3,700	11,700	98,400	<500	142,000	4,200	NA	NA	<2500
	Jan-00	Bailer	960	6,800	57,000	<1500	52,000	<750	NA	<19000	24,000
	Apr-01	Pump	970	12,000	14,000	< 500	16,000	270	< 25000	<6300	970
CDW-5	Feb-97	Bailer	19,300	370,000	< 100	< 100	66,000	7,900	NA	NA	< 250
	Jan-99	Bailer	12,000	95,000	16,000	<20	19,000	450	NA	NA	<350
	Jun-99	Bailer	334	4,480	2,160	3.7	1,120	99.2	NA	<5	<2
	Sep-99	Pump	18,000	360,000	72,000	<1000	82,000	4300	NA	<13000	1,400
	Jan-00	Bailer	5,200	62,000	14,000	<1500	14,000	<750	NA	<19000	<750
	Apr-00	Pump	5,000	21,000	2,500	<1000	2,500	<500	NA	<13000	<500
	Jul-00	Pump	8,900	150,000	32,000	<5000	32,000	<2500	NA	<63000	<2500
	Oct-00	Pump	7,900	90,000	37,000	<2000	18,000	<1000	<100000	<25000	<1000
CDW-6	Feb-97	Bailer	22,700	198,900	91,800	95	88,700	1,900	NA	NA	98,000
	Jan-00	Bailer	7,800	30,000	57,000	<1000	30,000	830	NA	<13000	26,000
	Jul-00	Pump	22,000	39,000	67,000	<1000	68,000	1500	NA	<13000	39,000
CDW-7	Feb-97	Bailer	170	840	900	< 5	31	34	NA	NA	< 12.5
	Jun-99	Bailer	16	9	504	<2	17	16.8	NA	<5	<2
	Jan-00	Foot Valve	13	49	780	<20	15	<10	NA	<250	<10
	Jul-00	Pump	21	43	270	61.0	59	16	NA	<130	<5.0
	Jul-00	Duplicate	18	37	250	54.0	51	15	NA	<130	<5.0
CDW-8	Jun-97	Bailer	860	1,500	1,000	8.9	800	56	NA	NA	<2.5
	Jun-99	Bailer	13,500	53,900	37,800	115.0	11,400	955	NA	<100	<40
CDW-9	Jun-97	Bailer	3,900	18,000	11,000	31.0	1,900	140	NA	NA	1,400
	Jan-99	Bailer	2,200	7,700	5,600	15.0	880	130	NA	NA	610
	Jun-99	Bailer	1,940	7,490	6,340	27.3	677	96.2	NA	<5	340
	Sep-99	Pump	7,400	41,000	16,000	<1000	3,100	<500	NA	<13000	1,500
	Jan-00	Bailer	940	3,400	3,200	<100	300	<50	NA	<1300	100
	Apr-00	Pump	2,600	11,000	8,100	<200	1,000	110	NA	<2500	640
	Jul-00	Pump	5,000	19,000	13,000	<1000	1,500	<500	NA	<13000	800
	Oct-00	Pump	5,500	15,000	12,000	<500	1,100	<250	<25000	<6300	960
	Dec-00	Pump	6,500	17,000	16,000	<500	2,500	<250	<25000	<6300	990
	Apr-01	Pump	3,400	9,500	8,400	< 200	1,300	130	< 10000	<2500	720
	Jul-01	Pump	3,400	11,000	9,300	<200	1,500	150	<10000	<2500	940

TABLE 7

HISTORICAL CONSTITUENTS OF CONCERN IN GROUNDWATER
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Sampling Date	Sampling Method	Tetrachloroethylene	Trichloroethylene	cis-1,2-Dichloroethylene	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethane	1,4-Dioxane	Acetone	Dichloromethane
CDW-10	Jun-97	Bailer	3,600	770	3,300	50	1,900	290	NA	NA	130
	Jan-99	Bailer	880	820	440	70	420	75	NA	NA	<30
	Jan-00	Bailer	130	140	140	26	21	16	NA	<50	<2.0
CDW-11	Jun-97	Bailer	<10	<10	<20	<10	<10	<10	NA	NA	<25
	Jan-99	Bailer	<2	<2	<5	<2	<2	<2	NA	NA	<2
	Jun-99	Bailer	<2	<2	3.4	<2	<2	<2	NA	<5	<2
	Sep-99	Pump	<5	<5	<5	<10	<5	<5	NA	<130	<5
	Jan-00	Bailer	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Apr-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<10	NA	<25	<1.0
	Jul-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Oct-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2	< 1	< 1	< 100	<25	<1.0
CDW-12	Jun-97	Bailer	8,600	1,500	160,000	63	110,000	1,400	NA	NA	300,000
	Jan-99	Bailer	3,000	1,300	102,000	<250	69,600	2,100	NA	NA	103,100
	Jun-99	Bailer	<2000	<2000	105,000	<2000	40,200	<2000	NA	<5000	131,000
	Jan-00	Bailer	<500	<500	83,000	<1000	38,000	<500	NA	<13000	84,000
	Jul-00	Pump	<500	<500	74,000	<1000	36,000	690	NA	<13000	60,000
CDW-13	Sep-97	Bailer	<1	<1	<1	<1	<1	<1	NA	NA	<2.5
CDW-14	Sep-97	Bailer	<1	<1	<1	<1	<1	<1	NA	NA	<2.5
	Feb-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
CDW-15	Sep-97	Bailer	<1	<1	<1	<1	<1	<1	NA	NA	<2.5
	Feb-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
CDW-16	Sep-97	Bailer	<2	37	<2	<2	<2	<2	NA	NA	<5
CDW-17	Feb-00	Foot Valve	<50	<50	770	<100	1,400	170	NA	<1300	<50
CDW-18S	Jan-99	Bailer	330	1,100	640	24	180	30	NA	NA	<60
	Jun-99	Bailer	87	313	850	49	73	29.6	NA	<5	6.3
	Sep-99	Foot Valve	410	2,000	2,900	200.0	370	81	NA	<630	<25
	Feb-00	Bailer	3,400	11,000	11,000	<200	2,000	200	NA	<2500	<100
	Apr-00	Pump	110	360	210	<20	40	<10	NA	<250	<10
	Jul-00	Pump	31	130	510	47	36	18	NA	<130	<5.0
	Oct-00	Pump	2,800	7,900	310	64	15	24	<500	<2500	<5.0
	Dec-00	Pump	340	1,300	1,200	10	200	24	<500	<130	<5.0
	Apr-01	Pump	29	160	160	< 4	22	5.3	< 100	<50	<2.0
	Jul-01	Pump	2.2	8	41	14	1.9	2.8	<100	<25	<1.0

TABLE 7

HISTORICAL CONSTITUENTS OF CONCERN IN GROUNDWATER
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Sampling Date	Sampling Method	Tetrachloroethylene	Trichloroethylene	cis-1,2-Dichloroethylene	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethane	1,4-Dioxane	Acetone	Dichloromethane
CDW-18D	Jan-99	Bailer	4,000	11,900	10,400	120	<25	260	NA	NA	<225
	Jun-99	Bailer	3,080	7,960	11,900	125.0	2,100	235	NA	<100	<40
	Sep-99	Foot Valve	5,000	15,000	15,000	<1000	4,500	<500	NA	<13000	<500
	Feb-00	Bailer	650	2,500	2,100	<100	300	50	NA	<1300	<50
	Apr-00	Pump	3,000	10,000	9,800	<400	2,200	<200	NA	<5000	<200
	Jul-00	Pump	2,500	8,200	9,400	<500	2,200	<250	NA	<6300	<250
	Oct-00	Pump	2,500	8,200	9,200	<200	2,100	160	<10000	<2500	<100
	Dec-00	Pump	2,500	8,300	10,000	<500	2,800	<250	<25000	<6300	<250
	Apr-01	Pump	2,100	6,200	6,400	< 200	1,700	110	< 10000	<2500	<100
	Jul-01	Pump	2,000	6,300	7,800	<100	1,700	130	<5000	<1300	<50
CDW-19S	Jan-99	Bailer	58	52	33	12	5.9	9	NA	NA	<1
	Jun-99	Bailer	3	12	15	<2	<2	<2	NA	<5	<2
	Sep-99	Pump	260	1,600	1,700	<50	230	27	NA	<630	<25
	Feb-00	Pump	13,000	16,000	14,000	<500	4,100	610	NA	<6300	<250
	Apr-00	Pump	240	430	390	<10	150	21	NA	<130	11
	Jul-00	Pump	8	43	30	<2.0	6	1.3	NA	<25	<1.0
	Oct-00	Pump	40	170	230	9.5	23	7.7	<100	<25	<1.0
	Apr-01	Pump	3	14	19	2.0	1.4	1.5	< 100	<25	<1.0
CDW-19D	Jan-99	Bailer	15,200	13,100	4,200	63	1,900	630	NA	NA	<80
	Jun-99	Bailer	12,400	9,470	7,490	62	2,140	645	NA	<5	893
	Sep-99	Foot Valve	17,000	8,200	55,000	<1000	22,000	<500	NA	<13000	34,000
	Feb-00	Foot Valve	11	72	150	12.0	9	5.2	NA	<50	<2.0
	Apr-00	Pump	12,000	11,000	12,000	<500	4,400	570	NA	<6300	410
	Jul-00	Pump	9,500	15,000	14,000	<1000	4,700	500	NA	<13000	1,800
	Oct-00	Pump	11,000	12,000	20,000	<500	7,400	420	<25000	<6300	6,500
	Apr-01	Pump	7,200	9,900	6,000	< 200	2,200	440	< 10000	<2500	280
ERM-1	Oct-92	Bailer	<50	<50	<50	<100	620	50	NA	<100	62
ERM-2	Oct-92	Bailer	5,100	2,710	1,650	<100	4,720	525	NA	<100	71
ERM-3	Oct-92	Bailer	3,020	87	2,500	<100	5,640	414	NA	<100	<50
	Mar-97	Bailer	2,100	240	3,100	<20	<20	130	NA	NA	<50
ERM-4	Oct-92	Bailer	3,200	2,270	418	<100	3,240	252	NA	<100	197
	Mar-97	Bailer	33,400	45,600	48,700	<50	9,400	870	NA	NA	5,600
	Jun-99	Bailer	93,700	36,000	26,800	<20	50,900	6,350	NA	<50	1,950
	Feb-00	Foot Valve	40,000	17,000	18,000	<1000	25,000	2,600	NA	<13000	3,200
	Jul-00	Pump	56,000	25,000	20,000	<1000	42,000	1,700	NA	<13000	2,800
ERM-11	Dec-95	Bailer	280	25	17	<3.5	110	<1.5	NA	<10	<5
	Jan-00	Bailer	31	4.0	2.3	<4.0	15	<2.0	NA	<50	<2.0

TABLE 7

HISTORICAL CONSTITUENTS OF CONCERN IN GROUNDWATER
Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

	Sampling Date	Sampling Method	Tetrachloroethylene	Trichloroethylene	cis-1,2-Dichloroethylene	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethane	1,4-Dioxane	Acetone	Dichloromethane
ERM-12S	Dec-95	Bailer	<1,500	20,000	9,700	<3,500	200,000	<1500	NA	<10,000	<5000
	Mar-97	Bailer	110	2,400	3,200	<100	69,000	250	NA	NA	<250
ERM-12D	Dec-95	Bailer	30	95	14	<3.5	170	<1.5	NA	<10	82.0
	Mar-97	Bailer	140	190	620	<1	930	27	NA	NA	
	Jun-99	Bailer	19	9	2.6	<2	28	<2	NA	<5	<2
	Jan-00	Pump	11	6	1.1	<2.0	19	<1.0	NA	<25	<1.0
	Jul-00	Pump	22	15	3.0	<2.0	45	2.5	NA	25	<1.0
GZ-1	Jan-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Apr-01	Pump	16	33	110	<4	67	5.9	<200	<50	5.6
GZ-2	Feb-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Apr-01	Pump	< 1	1.2	< 1	< 2	< 1	< 1	< 100	<25	<1.0
GZ-3	Jan-00	Bailer	4	170	3.2	<4.0	2.1	<2.0	NA	<50	<2.0
	Apr-01	Pump	1	5	< 1	< 2	1.3	< 1	< 100	<50	<2.0
GZ-4	Feb-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
GZ-4R	Feb-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
GZ-5S	Jan-00	Bailer	2	34	12	<2.0	6.6	5.4	NA	<25	20
	Jul-00	Pump	2	32	14	<2.0	6.4	5.7	NA	<25	14
GZ-5D	Jan-00	Foot Valve	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	34	<1.0
	Jul-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
GZ-6	Feb-00	Bailer	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Jul-00	Pump	1	1.1	<1.0	<2.0	1.6	<1.0	NA	<25	<1.0
	Oct-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
	Dec-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
	Apr-01	Pump	< 1	< 1	< 1	< 2	< 1	< 1	< 100	<25	<1.0
	Jul-01	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
GZ-7	Jan-00	Bailer	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Apr-01	Pump	< 1	< 1	< 1	< 2	< 1	< 1	< 100	<25	<1.0
GZ-7R	Jan-00	Foot Valve	1	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
	Apr-01	Pump	< 1	< 1	< 1	< 2	< 1	< 1	< 100	<25	<1.0
PZ-1D	Jul-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
PZ-1S	Jul-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	<25	<1.0
PZ-2S	Jul-00	Pump	49	1,100	190	<20	<10	21	NA	<250	<10
	Dec-00	Pump	190	3,000	240	<50	<25	32	<2500	<630	<25
	Apr-01	Pump	250	3,700	430	< 100	< 50	73	< 5000	<1300	<50
	Jul-01	Pump	190	3,600	400	31	4.9	56	190	<25	<1.0
PZ-2D	Jul-00	Pump	<1.0	<1.0	2.3	<2.0	<1.0	<1.0	NA	<25	<1.0
	Dec-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
	Apr-01	Pump	< 1	< 1	< 1	< 2	< 1	< 1	< 100	<25	<1.0
	Jul-01	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0

TABLE 7

HISTORICAL CONSTITUENTS OF CONCERN IN GROUNDWATER
Supplemental Investigation
General Chemical Corporation
Framingha.n, Massachusetts

	Sampling Date	Sampling Method	Tetrachloroethylene	Trichloroethylene	cis-1,2-Dichloroe.hylene	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethane	1,4-Dioxane	Acetone	Dichloromethane
PZ-3S	Feb-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	30	<1.0
PZ-3D	Feb-00	Pump	580	3,300	800	<100	450	<50	NA	<1300	<50
	Apr-01	Pump	570	4,200	1,200	< 100	440	< 50	< 5000	<1300	<50
PZ-4S	Feb-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	33	<1.0
PZ-4D	Feb-00	Pump	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	NA	72	<1.0
	Apr-01	Pump	< 1	< 1	< 1	< 2	< 1	< 1	<100	33	<1.0
GZ-13	Apr-01	Pump	450	130	17,000	< 200	4,400	1,200	< 10000	<2500	<100
GZ-14S	Apr-01	Pump	6	7	< 1.0	< 2.0	2.6	< 1.0	< 100	<25.0	<1.0
GZ-14M	Apr-01	Pump	4,800	2,400	17	< 20.0	240	250	< 1000	<25.0	<10.0
GZ-15S	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2.0	2.0	1.8	< 100	<25	<1.0
GZ-15D	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 100	<25	1.1
GZ-15R	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 100	<25	<1.0
GZ-16S	May-01	Pump	<1.0	10	<1.0	<2.0	<1.0	<1.0	<100	<25	<1.0
GZ-16M	May-01	Pump	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<200	<50	<2.0
GZ-17S	May-01	Pump	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<200	<50	<2.0
GZ-17M	May-01	Pump	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<200	<50	<2.0
GZ-18S	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 100	<25	<1.0
GZ-18M	Apr-01	Pump	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 100	29	<1.0
GZ-19DD	May-01	Pump	49,000	23,000	5,500	<20	14,000	1,600	<1000	1,400	8,200
EW-1	Jul-01	Pump [3]	33,000	19,000	15,000	<1000	45,000	<500	<50000	<13000	4,400
	27-Aug-01	Sample port [4]	37,000	19,000	8,000	<1000	40,000	<500	<50000	<13000	<500
	30-Aug-01	Sample port [4]	26,000	16,000	27,000	<1000	45,000	<500	<50000	<13000	9,800
	01-Sep-01	Sample port [4]	26,000	14,000	23,000	<1000	42,000	<500	<2500	<13000	8,200

NOTES:

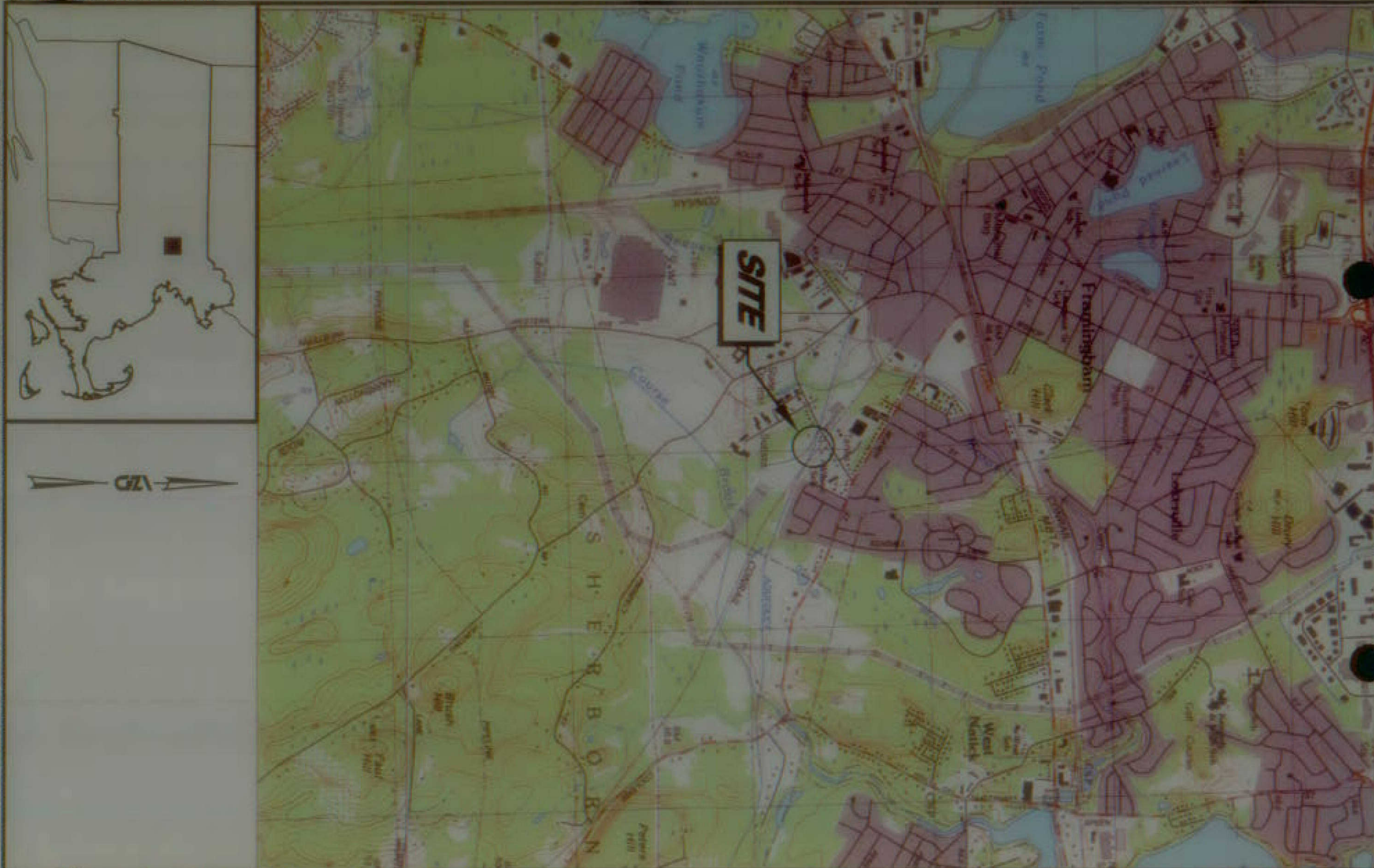
1. "NA" means that the constituent was not analyzed for during that sampling round.
2. Laboratory analytical results are shown in parts per billion ($\mu g/L$).
3. Sample was not taken via low flow.
4. Samples were taken from a sample port during pumping conditions.

TABLE 8
EXISTING AND PROPOSED ASSESSMENT MONITORING PROGRAM (AMP) TASKS

Supplemental Investigation
General Chemical Corporation
Framingham, Massachusetts

Sample Collection Location[1]/Task	EXISTING AMP[2]			REVISED AMP	
	Quarterly	**Semi-Annual**	**Laboratory Analyses**	**Semi-Annual (spring and fall)**	**Laboratory Analyses**
Groundwater Samples from Monitoring Wells and Piezometers	GZ-6 CDW-18S CDW-18D CDW-9 PZ-2S PZ-2D	GZ-1 CDW-4, GZ-2 CDW-11 GZ-3 CDW-19S GZ-7 CDW-19 GZ-7R PZ-3D	VOC by EPA Method 8260 (including 1,4-dioxane)	GZ-7R GZ-14S GZ-5D GZ-7 GZ-15S GZ-2 CDW-2 GZ-16M PZ-1S GZ-5S GZ-16S GZ-15D PZ-1D GZ-1 CDW-11	VOC by EPA Method 8021
				ERM-4, CDW-5, CDW-6	Appendix IX[3]
Surface water samples	SW-2 SW-USC-1 SW-3 SW-USA-1 SW-10 SW-CBW-W SW-DSC-2 SW-DSA-1	SW-2 SW-USC-1 SW-3 SW-USA-1 SW-10 SW-CBW-W SW-DSC-2 SW-DSA-1		SW-3 SW-CBW-W SW-10 SW-USA-1 SW-DSC-1	VOC by EPA Method 8021
GCC Facility Sump	1 sample	1 sample		Winter and Spring 2002[4]	
Residential Air Samples	91 Leland Street bedroom crawl space ambient upwind	91A Leland Street bedroom basement living room	VOC by Method TO-14	N/A[5]	
Groundwater Elevation Measurements	1 synoptic round	1 synoptic round	N/A[6]	1. Quarterly synoptic rounds 2. Automated water level data collection in GZ-7R[7]	

[1] Refer to Figure 2 for locations of these points.
[2] As specified in DEP Decision with Modifications, November 2, 2000.
[3] Samples will be collected from these three wells during the first revised AMP sampling event and analyzed for semivolatile organic compounds, TAL metals, cyanide and polychlorinated biphenyls (PCBs). Should these Appendix IX analytes be detected at levels below reportable concentrations (per Massachusetts Contingency Plan) in these wells, then the Appendix IX sampling will be discontinued. If the analytes are present at or above reportable concentrations, GCC will suggest modifications to the AMP in the Spring 2002 Assessment Monitoring Report.
[4] These will provide one sample from each season, since a sump sample was collected in Fall of 2000.
[5] Discontinued (approved by DEP). See text for details.
[6] Not Applicable
[7] For a period of one year, recording water levels once per hour.



SUPPLEMENTAL ASSESSMENT PLAN GENERAL CHEMICAL CORPORATION FRAMINGHAM, MASSACHUSETTS	SOURCE 1987 USGS FRAMINGHAM, MA QUADRANGLE MAP (NOT TO SCALE)	PROJ MGR: PAD DESIGNED BY: WDD REVIEWED BY: MJB OPERATOR: MKH DATE: 2/2/01
LOCUS PLAN		GZA GeoEnvironmental, Inc.

JOB NO. 15861.08

FIGURE NO. 1

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