Appendix I

Responses to IDEQ

And

EPA Comments

IDEQ Technical Review Comments on the Draft Five-Year Review Document for the Naval Reactors Facility Inactive Landfill Areas, Operable Units 8-5/8-6 – December 28, 2000

1) **Section 3.2.1, Page 5, First Paragraph, Next to Last Sentence**

In addition to the natural sources identified, it is likely that recharge to the Snake River Plain Aquifer (SRPA) near the NRF also results from man-made sources such as the sewage lagoons, the industrial waste ditch, and historically, the various leaching beds/pits. Please acknowledge these potential sources in the text.

NRF Response

The following word will be added to the sentence noted: "Near NRF, natural recharge...." The following will also be added as a new last sentence: "Anthropogenic recharge sources include the NRF sewage lagoons, the Industrial Waste Ditch, and historical site leaching beds/pits; these recharge sources are relatively small in comparison to natural sources."

2) **Section 3.2.1, Page 5, Fourth complete paragraph on page**

Please identify the estimated locations of perched water beneath the NRF. Having this information would be helpful in interpreting the 5 year review monitoring data.

NRF Response

The text will be changed as follows: "...Perched water, which lies above the regional water table approximately 100 feet below land surface, occurs in several locations at NRF including beneath the IWD, the sewage lagoons, and historically the leaching beds/pits. In general, perched water forms at any location where a substantial surface recharge is present...." The following sentence will be added to the end of this paragraph: "Figure 2 shows the suspected locations of current and historical perched water zones." This figure is attached at the end of NRF comment responses.

3) **Section 3.6.1, Page 20, Last Paragraph, First Sentence**

Please describe what sort of records were used to characterize the source term, since the following sentence states that no landfill records existed at the time of disposal.

NRF Response

The 1971 to 1988 records discussed were of the wastes sent from NRF to the CFA Landfill or other off-site disposal facilities. The following sentence will be added after the first sentence in the paragraph: "These records as documented in the INEEL Industrial Waste Management and Information System, include an inventory of the wastes sent from NRF to the CFA Landfill or other approved off-site hazardous waste disposal facilities, and are considered representative of the types of wastes in the NRF landfills." The next sentence will be revised to read, "...no official NRF record was kept...." For clarity, the existing third sentence will be revised to read, "Thus, the more recent retrievable INEEL records, provided a reasonable estimate of the type, and a conservative estimate of the quantity, of wastes generated at NRF from 1951 to 1970 when the three landfills were active."

4) **Section 5.3.1.1.1, Page 41**

Please indicate whether chromium was analyzed for hexavalent, trivalent, or total chromium.

NRF Response

NRF analyzes groundwater for total chromium, since that is believed to be the most practical analysis protocol. The word "(total)" will be added after "chromium" in the paragraph. NRF believes that the majority of chromium is in the trivalent form.

5) **Section 5.3.1.2, Page 41, Last Sentence**

Please reference where in the document the results for organic analytes may be found.

NRF Response

As mentioned in this section, organic contamination of groundwater near NRF is not a problem and therefore a full listing of the organic results was not considered necessary. However, for clarity a table will be added. Because this table is comprehensive in nature, the text in Section 5.3.1.2 (below) was modified to reflect all organic hits. Modified portions of the section are underlined.

"NRF groundwater samples are analyzed for volatile and semi-volatile constituents once each year. As a rule, most NRF wells are not expected to contain organic constituents; however, in the past, organic compounds were used at NRF and discarded into the Landfill Sites, so monitoring for these compounds is still performed.

"Most organic compounds are not present or detectable in water monitored by NRF; however, low levels of some organic compounds were found in water collected from NRF-6, NRF-8, NRF-9, USGS-12, USGS-97, USGS-98, USGS-99 and, USGS-102. These compounds include tetrachloroethylene (PCE), 1,1,1-trichloroethane (TCA), naphthalene, di(2-ethylhexyl)phthalate), and chloroform. Chloroform is a potential degradation product of carbon tetrachloride. Carbon tetrachloride was known to be used in the past at NRF. Naphthalene is a gasoline additive and phthalates are common laboratory contaminants. Dichloromethane, TCA, and 1,2,4-trimethylbenzene occurred at their MDLs, which may indicate uncertain detection. Organic compounds were detected in two quality assurance samples (Field Blanks) collected at NRF-8 and USGS-99 during August 1998 and September 1997, respectively, and one replicate collected at NRF-9 during September 1997. These compounds include dichloromethane, naphthalene, ethylbenzene, toluene, 1,2,4-trimethylbenzene, m- & p-xylenes, and 1,1-dichloropropanone (as a result of a library search; the origin of the compound is unknown). All these compounds (except 1,1-dichloropropanone) are components in, or byproducts of, the combustion of hydrocarbon fuels (gasoline, diesel, and heating oils).

"All organic compounds occurred at levels well below any Federal drinking water standards. Many of these compounds were found in samples of soil gas collected from the Landfill Sites, also in low concentrations. However, because of the infrequent and low-level occurrence of organics in NRF groundwater, a detailed listing of organic results

is not presented here. A full accounting of organic data has been published in four USGS Open-File Reports (00-236; 99-272; 97-806; 95-725; and, 93-34). Table 10 is a summary of all detections of organic compounds in NRF groundwater and Quality Assurance samples."

The new Table 10 is shown at the end of the responses to comments.

6) **Section 5.3.2.1.1, Page 48 [second paragraph], and Section 5.3.2.1.2, Page 49**

This paragraph states that ...there is still some question whether NRF-7 is influenced by water from the IDW. However, this statement appears to conflict with the discussion in Section 5.3.2.1.2 which states the history of NRF-7, located near NRF, indicates it is not in fact influenced by the IDW or sewage lagoon to any statistically detectable extent. Please reconcile the text. This would probably best be accomplished by discussing the uncertainties in the sample results.

NRF Response

For most constituents, the concentrations appearing in well NRF-7 are either lowest or near lowest compared to the other NRF wells. This pattern has some exceptions. Therefore, while results from this well are considered to represent background, there are still questions whether some influence from the IWD is present. In Section 5.3.2.1.2 it is implied, but perhaps understated, that an influence from the IWD is possible. The sentence in the first paragraph of Section 5.3.2.1.2 beginning: "Neither of these...", will be change to read "USGS-12, located three miles upgradient of NRF activities, is not influenced by NRF. NRF-7, located near NRF, was considered a background well for this report, since it does not appear to be influenced by the IWD or sewage lagoon to any statistically detectable extent." See response to the next comment for additional information on this topic.

7) **Section 5.3.2.1.1, Page 48, Last Paragraph on Page**

The text states that when possible and appropriate, [background] data from NRF-7 will be considered. Please provide some explanation as to when it would be appropriate to consider the data from NRF-7 to be used as background data.

NRF Response

NRF-7 data were used in all instances except for aluminum and chromium. In these cases the evidence showed that the NRF-7 results, for as-of-yet unresolved reasons, were inconsistent with what was expected for background data. (While influence from the IWD or sewage lagoons solely for these two constituents appears unlikely, some other influence may exist that still negates NRF-7's value as a background well for these two constituents.) For clarification, the last three sentences of the second paragraph of Section 5.3.2.1.1 will be revised to read, "For this report, data from NRF-7 was considered for all constituents except aluminum and chromium, due to inconsistencies with USGS-12 data for these two metals. For future reviews, inclusion of NRF-7 data will be determined on a case-by-case basis, and will be based on continued statistical consistency with data from USGS-12."

8) **Section 5.3.4.3, Page 64, Last Sentence**

This statement, although probable, is not the only possible explanation for the observed results. It is possible that the organic contaminants have migrated significantly from the landfills, but are present primarily in discrete vertical intervals (such as within an interbed), and these contaminants are effectively diluted over the 50 foot screened interval. This possibility is explained in Section 7.3, Item 2.

NRF Response

It is agreed that this is a possibility; however, this is not seen as likely, therefore NRF prefers to keep the text as presented. Section 7.3 was discussing contaminants in general and was not intended to imply this was likely for organic contaminants.

9) **Section 6.1.2, Page 67, Last Paragraph on Page, First Sentence**

It may be more appropriate to state that The Remedial Investigation concluded that the likely source.... It is unclear what is meant by a geologic investigation.

NRF Response

This sentence will be changed to: "Evidence collected during past Remedial Investigations indicated that...."

10) **Section 7.3, Pages 73-74, Item 2**

If future groundwater sampling results show clear increasing contaminant trends, the Agencies may consider better evaluating the vertical distribution of the contamination. One way to do this using the existing wells would be to conduct micropurging. Use of a low flow sampling pump that could be set, for example, near the top of the water column would minimize mixing and dilution.

NRF Response

NRF agrees that, should the situation warrant, this would be one possible way of ascertaining the vertical distribution of potential contaminants in groundwater.

11) **Section 7.3, Page 74, Item 3**

This item suggests that total metals concentrations in NRF-10 and NRF-13 result from suspended solids in the samples resulting from interbeds that intersect the screened intervals in those wells. Please identify which metals are suspected to be affected by the interbed sediments, and describe the data to support this assertion. At this time, IDEQ does not support filtering the metals samples since it is assumed that a hypothetical future residential receptor would not be filtering groundwater for domestic use.

NRF Response

The intent of Item 3 was to note the deficiency of high suspended solids in NRF-10 and NRF-13, and that there appears to be a connection between high suspended solids and high metal concentrations. Specifically, examination of data from NRF-10 and NRF-13

suggest that the levels of aluminum, barium, chromium, copper, manganese, nickel, and possibly lead and arsenic are all elevated in relation to expectations. Two sources of evidence support the concept that suspended interbed sediments may be affecting water quality. First, the groundwater monitoring results themselves are unexpectedly high when compared to surrounding wells, given what is known about source areas and groundwater flow directions. Second, shortly after the wells were constructed, analysis of samples from some of the wells produced unexpected levels of metals. Analysis of filtered samples from the same wells collected concurrently with the unfiltered samples reduced metal concentrations.

Filtering one half of a split sample and comparing the results to the results of the unfiltered half of the sample is intended to indicate the proportion of elevated metals that are attributable to the suspended solids and which are dissolved in the water. The following words replace the last sentence of Section 7.3, item 3: "Filtering the samples prior to analysis may reduce the reported metal concentrations in the samples. Comparison of these results with the results of an unfiltered split sample may indicate the portion of metals attributable to the suspended solids."

NRF acknowledges that the strategy outlined above is intended to answer a specific question related to suspended solids. In relation to the higher than expected metals in NRF-13 (chromium in particular), the noted strategy is only a first step in determining the origin of the higher metals, whether it be natural or related to historical site operations. During the first week of February, the USGS, while collecting 1st quarter 2001 groundwater samples, also collected filtered samples for selected metals. The results from filtered samples will be submitted along with other (unfiltered) 1st quarter 2001 sample results.

In addition, since the trend for chromium in NRF-13 appears to be increasing, the following paragraph was added to the end of Section 8.3:

"DOE, EPA, and IDEQ will develop a list of criteria for re-evaluating groundwater chromium and for considering possible responses in the event that apparent trends in chromium concentrations observed in NRF-13 continue, and Federal MCLs are exceeded for an average of four quarters."

12) Section 8.2, Page 75, Second Paragraph under Section Heading

Please identify a schedule for posting warning signs at the landfills.

NRF Response

The following sentence will be added to the end of Section 8.2: "The signs are planned for installation during the summer of 2001."

13) [No Comment 13]

14) **Section 8.3, Page 75, Second Paragraph under Section Heading, Second Sentence**

Please also include that sampling techniques could be modified, as indicated in Comment #10.

NRF Response

The sentence in question will be modified to read, "The number of wells could be increased or decreased; constituents on the monitored list could be added or deleted; sampling could be targeted (such as in micropurging); or the sampling frequency could be adjusted." Also, the fourth sentence of the paragraph will be modified to read, "Based on the data...NRF proposes no changes in the number or location of monitoring wells, or in sampling methodology, at this time."

15) **Section 7.4, Page 74 and Section 8.4, Page 76**

More information should be provided regarding the two soil gas monitoring probes that are plugged. Please discuss possible reasons for the operational problem. In addition, more explanation is needed to support the assertion that little or no contamination would be detected in the plugged probe even if it were functioning properly. Given that soil gas concentrations at NRF-1 have always been substantially higher than at NRF-51 and NRF-53 (by roughly an order of magnitude), having adequate monitoring at NRF-1 is a distinct concern. At this time, there has been insufficient information provided for IDEQ to concur that the plugged monitoring probes are located in a non-critical area, and therefore do not need to be repaired. The Agencies should discuss this matter further during the comment resolution period.

NRF Response

The plugging problem associated with the two soil gas monitoring probes at Landfill 8-05-01 (NRF-1) is attributed to inadequate execution of construction techniques. NRF plans to rectify the plugging problem at 8-05-01 by making an attempt to clear the restrictions within the probes. If this is unsuccessful at the totally plugged MW1-2, NRF will either augment the information in Section 8.4 in a letter requesting regulatory agreement that MW1-2 is in a non-critical area and no further action is required, or NRF will plan construction of a new monitoring probe. The following sentence will be added at the end of item 1 in Section 7.4: "The plugging problem associated with these two monitoring probes may be due to defective construction."

The following will replace the existing last sentence of Section 8.4, first paragraph: "Hence, NRF expects that little or no contamination would be detected in the plugged monitoring probe even if it were functioning correctly. However, NRF will attempt to rectify the monitoring probe plugging problem at 8-05-01 by clearing the restrictions within the probes. Attempts to unplug the probes will be conducted during calendar year 2001. If unsuccessful, two options will be considered: 1) seek regulatory agreement that the plugged probe is in a non-critical area and no further action is required; or 2) construct a new monitoring probe to replace the plugged probe."

16) **Appendix A, General Comment**

This appendix provides a thorough presentation of groundwater monitoring data, and interpretations, and conclusions based upon those data. Although this document was created pursuant to the inactive landfill remedy (OU 8-5/8-6), the text sometimes attributes the observed groundwater contamination to past or present releases associated with the Industrial Waste Ditch (IWD, OU 8-7). On the basis of the information presented, IDEQ agrees that the IWD appears to be the primary source for elevated concentrations of some of the contaminants (e.g., chromium, chloride). The 1994 Record of Decision for the IWD selected a No Action remedy for the IWD, but acknowledged that groundwater monitoring associated with the OU 8-5/8-6 selected remedy would be used to evaluate the inactive landfills and other areas at NRF. Therefore, it is appropriate to discuss interpretations related to the IWD and sources other than the inactive landfills in this five year review. However, if the results of future groundwater monitoring suggest that contamination resulting from the IWD (particularly chromium) is increasing and resulting groundwater quality is no longer protective, the Agencies may re-evaluate the No Action decision for this site.

NRF Response

Comment noted. No changes to the document were necessary.

17) **Appendix A, Section 5.0, Page A-41, Fourth Paragraph**

This paragraph requires modification for clarity. Rather than referring to NRF groundwater as clean by comparison to other INEEL sites, we suggest that the focus be on the fact that groundwater monitoring conducted under the FFA/CO within the past eight years have detected no exceedences of primary MCLs. The text could state that some exceedences of secondary MCLs have been detected as part of routine monitoring, indicating that site activities have impacted groundwater quality. The differences between primary and secondary MCLs should be discussed; secondary MCLs affect the aesthetic qualities relating to the public acceptance of drinking water, and are not enforced at the NRF. Finally, the text should identify the contaminant, time, and duration that exceedences of primary MCLs were detected. Specifics regarding these past exceedences, compared with results from current monitoring for these contaminants, provides the basis for cleanup decisions made and associated monitoring that is conducted under the FFA/CO.

NRF Response

This paragraph will be replaced with the following text:

"Analysis results of NRF groundwater over the past 11 years demonstrate that activities at NRF have not significantly degraded the quality of the Snake River Plain Aquifer near NRF. No annual average concentration for any constituent has exceeded primary MCLs (regulatory levels). A few individual sample exceedences occurred: chromium exceeded its primary MCL twice and lead exceeded its MCL three times since 1990. In each case, the occurrences of these excessive concentrations were brief and did not constituent a trend. The concentrations for aluminum, iron, and manganese frequently exceeded secondary MCLs (aesthetic water quality parameters which are not enforced at NRF)."

18) **Appendix D, General Comment**

This appendix should include completed landfill inspection forms.

NRF Response

The completed landfill inspection forms will be added to this appendix.

EPA REVIEW OF 11/14/00 DRAFT FIVE-YEAR REVIEW DOCUMENT FOR THE NAVAL REACTORS FACILITY INACTIVE LANDFILL AREAS – December 28, 2000

1) **Page 62, Section 5.3.4.2:** The trend analysis of soil gas monitoring data concentrates on a general upward or downward trend in organic concentrations. Coincident peaks and dips shown in the graphical presentation of the data in Appendix H are mentioned, but are not explored. The combined graphs shown in Appendix H seem to show a pattern of peaks during Fall and Spring monitoring events and dips during Winter and Summer monitoring events. This pattern is more clear in data from landfills 8-05-51 and 8-06-53 than in the data presented for landfill 8-05-1. If there is a seasonal pattern in the data, the peaks and dips might provide additional information about cap performance during periods of precipitation or snow melt.

NRF Response

Although there are some apparent patterns in the graphical presentation that may be attributed to seasonal events (i.e., changes in precipitation or increased infiltration of water from snowmelt), NRF considers it premature to draw conclusions at this time. Other factors may be the cause of these patterns (see paragraph below). Meteorological data will be needed to try and correlate changes in precipitation and barometric pressure changes with the peaks and dips observed in the graphical presentation.

The following paragraph will be added after the first paragraph in Section 5.3.4.2:

"With reference to specific patterns in the graphical presentation of the soil gas data, coincident peaks or dips may be attributed to one or more of the following factors: seasonal events (i.e., changes in precipitation or increased infiltration of water from snowmelt), effects of water infiltration within the periphery of the cover on contaminant migration, significant variations in barometric pressure, chemical-specific characteristics affecting migration patterns, or attainment of a new equilibrium within the contaminant/containment system caused by the introduction of the landfill covers. In order to determine whether these factors are causal in the appearance of peaks and dips in the graphical presentation of the soil gas data, additional data (i.e., meteorological data and soil gas monitoring data for additional quarters) will be needed. Some of the factors that will be explored in this section, specific to Site 8-05-1, are the attainment of a new equilibrium and infiltration of water within the periphery of the cover, in order to explain the dissimilarity between the graphical presentation of the 8-05-1 soil gas data and data from the other two sites."

2) **Page 75, Section 8.3:** A number of salts are recommended for deletion from the monitoring program including calcium. In Section 3.2 of Appendix A, calcium is listed along with chromium, chloride, and tritium as a good indicator of groundwater quality trends. In Section 3.2.3 of Appendix A, an upward trend of calcium is identified at NRF-7 while there appears to be a downward trend at most of the other monitoring wells. It is not clear why calcium is recommended for deletion from the monitoring program if, in general, it is considered a good indicator of groundwater trends and, specifically, is found at increasing levels in a local background well. Does removing calcium from the suite of metals analysis provide a significant cost savings?

At the end of 2002, when groundwater sampling frequency is reduced from quarterly to three times a year, the three sampling events should coincide with the timing of historical sampling events in order to preserve data comparability.

NRF Response

Although this parameter is not directly necessary in assessing NRF's impact on the SRPA, NRF agrees that it is a good indicator of geochemical trends. Furthermore, potassium and magnesium, which were also proposed for deletion, are analyzed at the same time using the same method as calcium, and are also good indicators. Since the combined cost of analyzing for these parameters is relative small, they will not be deleted as previously stated. References in the text to deletion of these parameters will be removed (Sections 6.2.3.2.3 and 8.3).

Pertaining to the second suggestion, NRF will make every effort to ensure that the timing of the collection of groundwater samples will be as compatible with historical sampling as possible.

3) **Page 76, Section 8.4:** It states here that repairing the plugged monitoring probe, MW1-2, is not necessary because it appears to be located in a non-critical area. In Section 5.2.1.3, it states that methods to remedy the plugged soil gas probe are being investigated. The nature of the problem should be described in more detail (e.g. the probe hole is filled with sediment) and actions planned to explore the problem should be clarified. It would be useful to find a means of repairing the plugged probe. If the partially plugged probe, MW1-1, were to become completely plugged and there is no method to address the problem, no data would be available from the north end of landfill 8-05-1. The north portion of the landfill is expected to contain less waste as discussed in Section 3.5.2.1 and this would seem to be reflected in monitoring results which show consistently higher organic levels at the south end of the landfill. However, the lower organic levels at the north end of the landfill are at least in the range of levels found at the other two landfills. Regardless of any comparison of organic concentrations, monitoring data from the north end of the landfill can aid in revealing trends at landfill 8-05-1. Understanding trends at this landfill is especially important given an apparent increase in organic concentrations as indicated in the soil gas charts in Appendix H complicated with a possible data anomaly as discussed in Section 5.3.4.2.

NRF Response

See response to IDEQ comment 15.

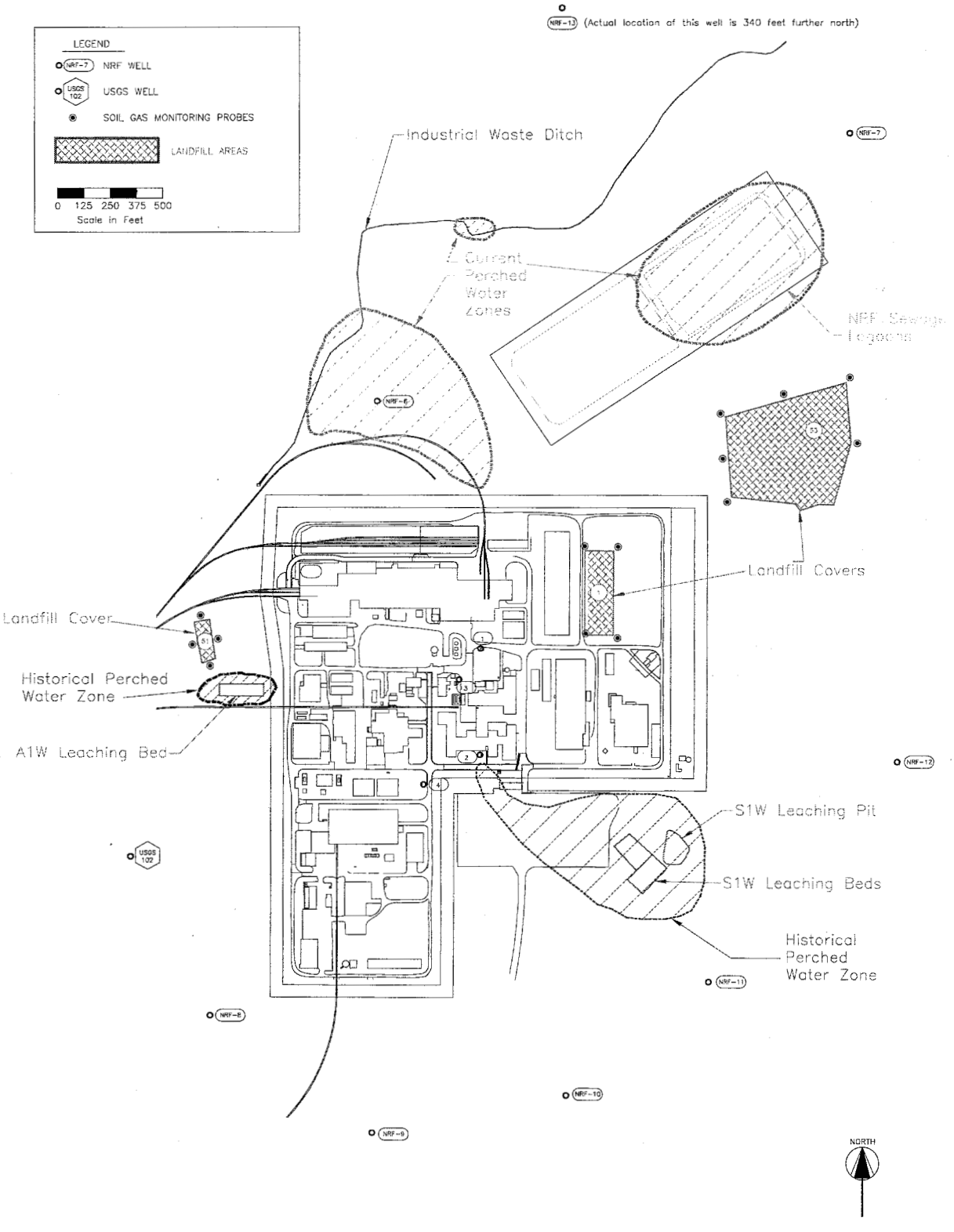

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Figure 2 Suspected Location of Current and Historical Perched Water Zones at NRF

Table 10 Occurrence of Organic Compounds in NRF Groundwater from 1997 through 1999

All Concentrations are in µg/L	1997									1998		1999		
	NRF-6	NRF-8	USGS-12	USGS-97	USGS-98	USGS-99	USGS-102	QAS-55	QAS-56	NRF-6	QAS-64	NRF-6	NRF-9	USGS-97
Chloroform (0.1)	0.27									0.3		0.2		
Dichloromethane (0.5)											0.5			
1,1,Dichloropropanone**											21.0			
Ethylbenzene (0.1)											0.3			
Naphthalene (0.2)		2.6			0.96			0.59	9.6					
Tetrachloroethene (0.2)	0.47									0.5		0.3		
Toluene (0.5)											3.6			
1,1,1-Trichloroethane (0.1)										0.1				
1,2,4-Trimethylbenzene (0.1)											0.1			
m- & p-Xylenes (0.2)											0.6			
Di(2-ethylhexyl)phthalate (0.6)			5.60	1.50		4.70	0.70						0.60	1.20

1) Numbers in parenthesis after constituent names are the constituent's MDL
2) Constituents in blue occurred in concentrations at the MDL
3) Constituents in yellow occurred at concentrations above the MDL
4) QAS-55 is a quality assurance sample (Field Blank) collected at USGS-99 in September 1997.
5) QAS-56 is a quality assurance sample (Replicate) collected at NRF-9 in September 1997.
6) QAS-64 is a quality assurance sample (Field Blank) collected at NRF-8 on August 5, 1998.

** 1,1-dichloropropanone was found in this sample as a result of a library search, which is the laboratory looking for compounds not included in the list of targeted analytes.

Not in Color (see text for colored version)