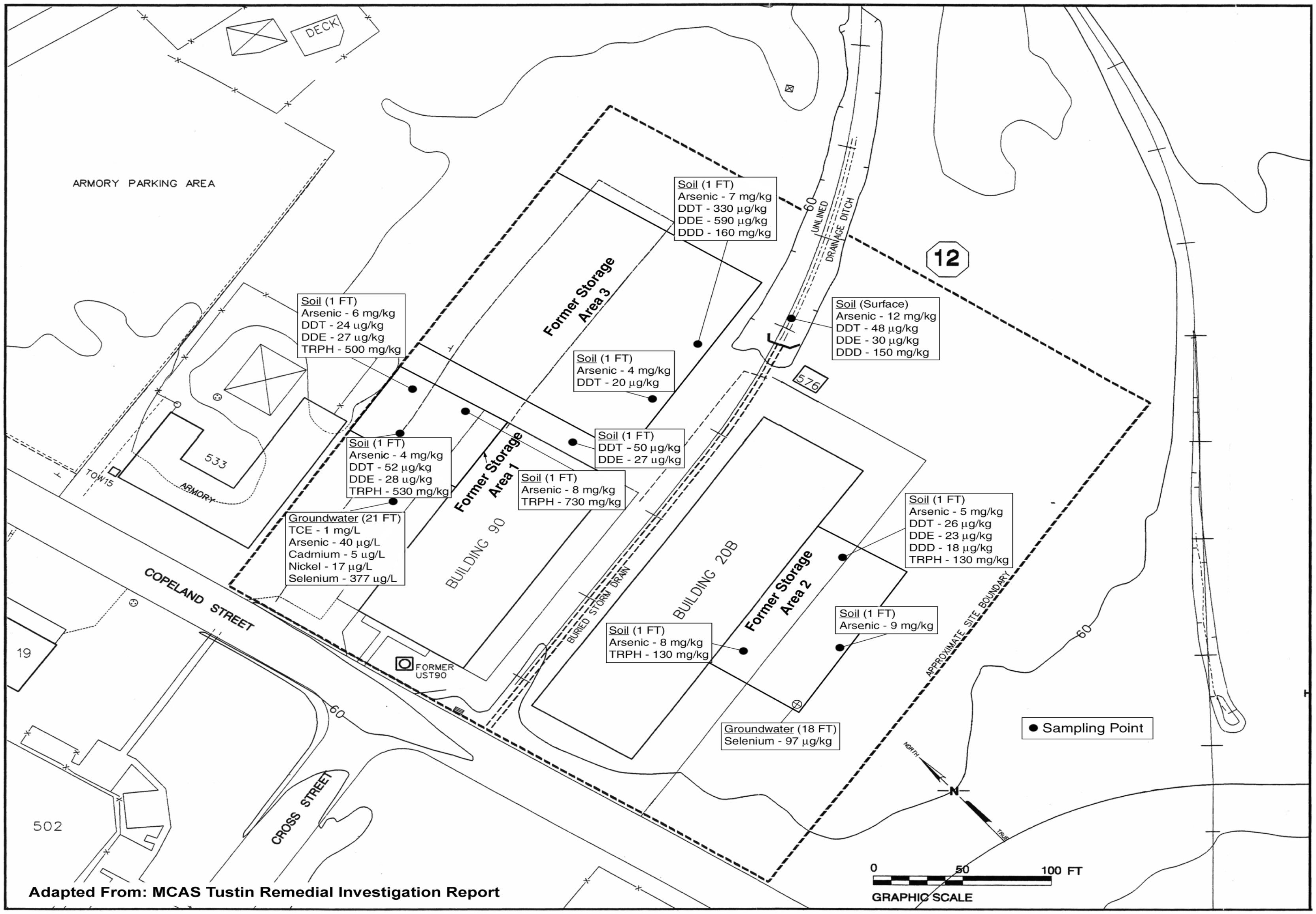
Exhibit 5
ESI Distribution of Contaminants Above Screening Levels



there does not appear to be a heavy metals problem at IRP-12 (Exhibit 5). The metals data results are made more difficult to interpret as there are no reported textures for the samples sent to the laboratory and, hence, it is not known whether the results are from a metals-rich clay or a metals-poor sand. pH values were alkaline, which should assist in immobilizing any metals in a cationic state.

Arsenic was found in all the soil samples tested at levels above the screening level (2 mg/kg). This widespread distribution of arsenic with no apparent relation to areas with contamination would imply it is naturally occurring. However, definitive background values will be established from existing data during the RI.

TRPH was detected in several of the soil samples. Comparing the results with those reported as TICs in the GC/MS work would indicate that these are mid-level distillates such as are found in fuel oils, hydraulic fluids, and mineral spirits. Since the aromatic fraction is missing in these samples even at low levels, the most likely origin of the TRPH is hydraulic fluids or mineral spirits. As no PAHs or heavy metals were detected, the presence of waste oils was not confirmed. Since waste oils are called out as a primary contaminant of concern in the site history, either the history is incorrect or the SI missed the correct areas. An expanded grid should be sampled to ensure that there are no waste oils present.

DEHP was the only SVOC present in several samples. The highest value detected was 600 ppb with a “J” qualifier. A number of DEHP samples of varying concentrations were qualified “U” throughout the SI testing program because of method blank contamination. This is not to say that there is not any DEHP present at IRP-12 but rather that its presence at this level is suspect.

The validators rejected (“R”) the acid extractable (phenolics) results for soil samples MT-12-2, MT-12-4, and MT-12-5.

Dichlorodiphenyltrichloroethane (DDT) (up to 330 Fg/kg) and its degradation products were detected in the shallow soils. These values are consistent with those found both in operational areas of the base and nonoperational (e.g., Parcels C and D) areas. Although they were found to be above screening values, they do not represent a health risk (see Preliminary Endangerment Assessment for Parcels D [now 33] and C [now 38 and 39] [SWDIV 1992b,c]). While the laboratory reported the presence of acetone and MC in several soil samples, these values were given a “U” qualifier due to method blank contamination.

With several notable exceptions (some of which are mentioned above), the soil data for IRP-12 are of a usable quality but have some uncertainty as a number of the results have had “J” qualifiers applied for various reasons by the SI data validators.

Sediment Investigation

An unlined drainage ditch lies in the eastern portion of IRP-12 (Exhibit 3). A sediment sample taken from this ditch for the SI indicated low levels of DDT (48 Fg/kg), dichlorodiphenyldichloroethene (DDE) (30 Fg/kg) and TRPH at 150 mg/kg.

Groundwater Investigation

Selenium, at levels consistently above the MCL, was detected in all the groundwater samples taken. The greatest value (366.6 Fg/L) was found in MT-12-2, which also contains the only detection of TCE (1,000 Fg/L). Duplicate analysis of MT-12-2 was performed and there is good agreement on selenium (377.1 Fg/L versus 366.6 Fg/L) and nickel (16.6 Fg/L versus 16.6 Fg/L), but poor agreement with cadmium (5.25 Fg/L versus ND). Selenium is not linked to any base activity, especially when detected alone. The ANL Phase 1 investigation (ANL 1995a) identified a debris flow appearing to contain some cinnabar clasts in the northern portion of the site. Since selenium values in the groundwater are seen throughout most of the base, the selenium may be naturally occurring. This will be a subject of both the investigation at IRP-12 and the basewide groundwater monitoring program.

The range of concentrations observed in the selenium values may be linked with the reported poor matrix spike recovery. All selenium values have had a “J” appended to them by the validator for poor matrix spike recovery.

Very few metals were detected in the HydroPunch™ samples. Because of the lack of QC support data, the metals concentrations reported have all had a “J” qualifier applied to them (CTM [BNI 1995b]). Silver and thallium results were rejected for accuracy problems.

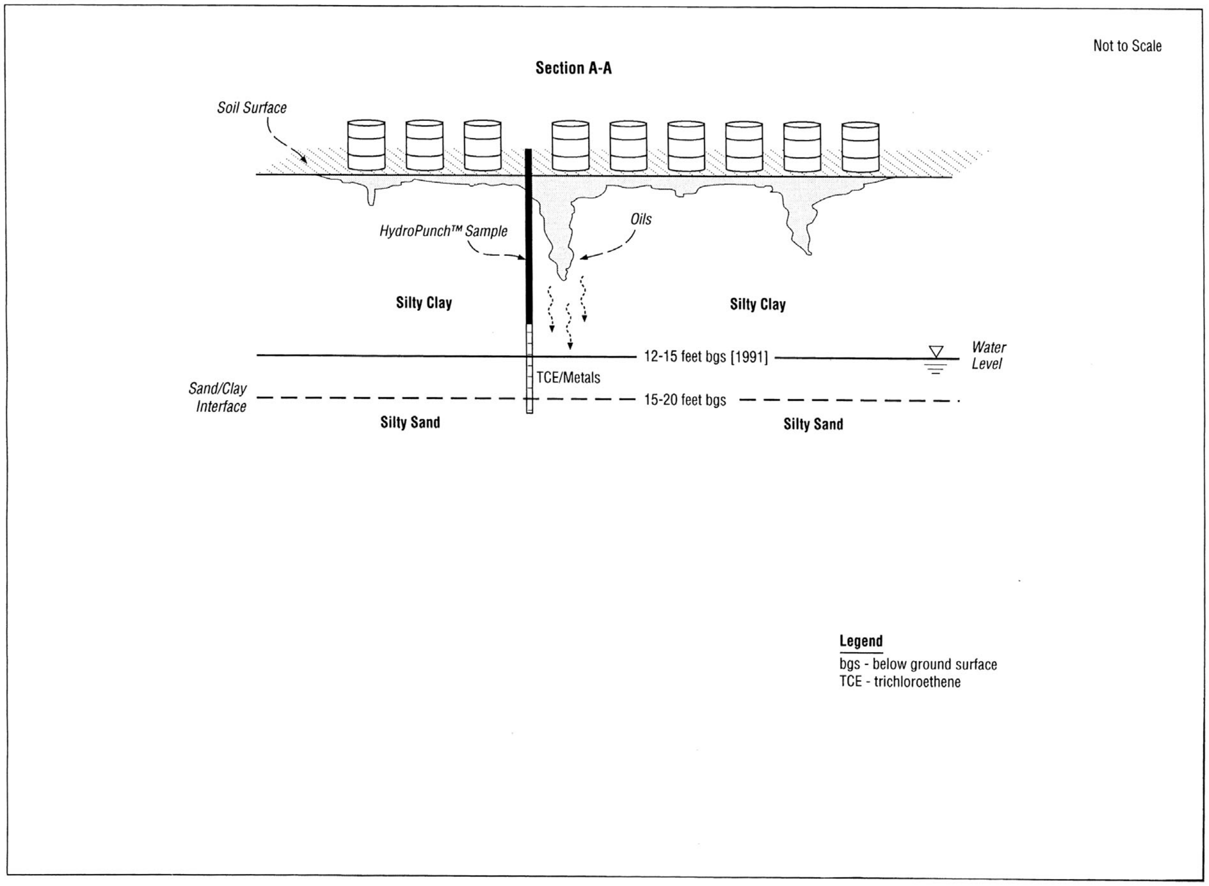
While MC “hits” were detected at MT-12-1 (71 Fg/L) and at MT-12-4 (65 Fg/L), no other VOCs were present at these locations. The laboratory has a demonstrated method blank problem with MC and acetone so it is likely that these detects are the result of laboratory error. TCE at MT-12-2, on the other hand, appears to be definitely present. Since no TCE was detected in any of the soil samples, the source of the TCE is either upgradient of IRP-12 or west of the original investigation grid. There is an O/W separator (AOC TOW-15) and a reported degreasing operation at Building 533, which lies directly upgradient from IRP-12. The groundwater investigation will be expanded to include this area.

No pesticides or SVOCs were detected in the groundwater and the validation report did not indicate any problems with their analysis.

Conceptual Model

The preliminary conceptual site model and site exposure model for IRP-12 are shown on Exhibits 6 and 7.

Exhibit 6
Initial Conceptual Model Pictorial



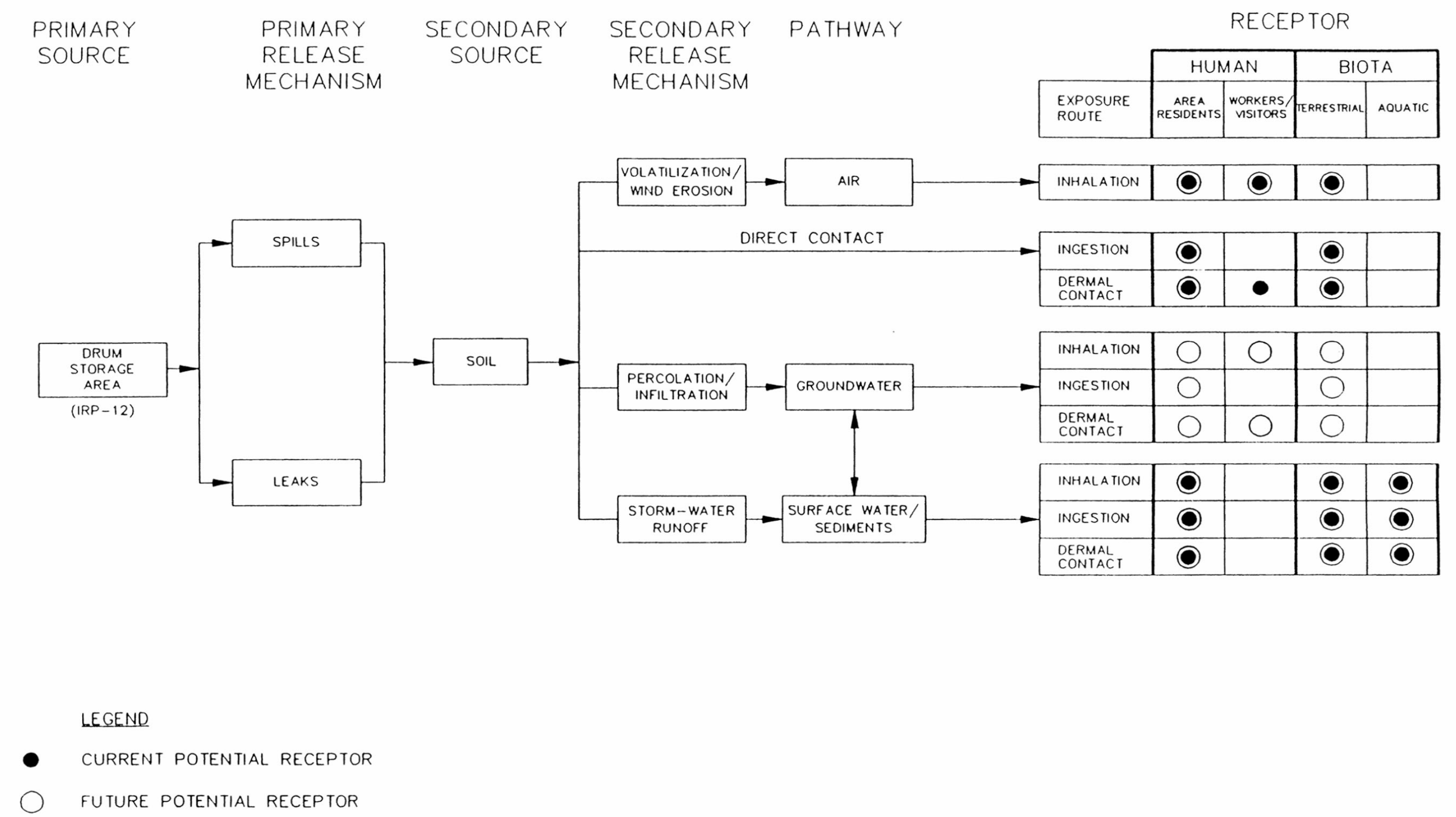
Primary Release Mechanism. The primary release mechanism was leaks or spills from drums stored in this unit. Drums are currently stored on bermed plastic tarps in the area to the east of Building 90. Contaminants released to the soil surface would saturate surficial soils and move downward under gravity.

Secondary Source. The secondary source for contaminants is the surrounding soil impacted by spills or leaks.

Secondary Release Mechanism. Fugitive dust releases or volatilization are possible secondary release mechanisms in the unpaved areas adjacent to the Building 90 storage area.

Percolation or infiltration are possible secondary release mechanisms in the subsurface soils in the storage area east of Building 90. The area north of Building 90 and most of the area south of Building 20B are currently paved.

Exhibit 7
Initial Exposure Conceptual Model



Adapted From: MCAS Tustin Remedial Investigation Report

Stormwater runoff is a possible secondary release mechanism on the surface soils. Spilled or leaked contaminants can be transported by overland flow of the stormwater from the surface of the storage area to the surrounding soil or drainages.

Pathways. The potential pathways are air, groundwater, and surface water. Airborne contaminants are transported through fugitive dust and volatilization. The transport through air is affected by wind speed and direction, type of contaminant, and weather conditions. The typical wind condition at MCAS Tustin is from the west/southwest at less than 10 knots although 40-knot northerly Santa Ana winds occur seasonally.

Surface water transport is affected by the amount of rainfall, the surface soil conditions, and the extent of pavement around the unit. The mean annual rainfall at MCAS Tustin is 12.8 inches, most of which occurs from November through April.

Receptors. Current and/or potential receptors of chemicals at this site via inhalation are Navy personnel, visitors, workers involved in site excavations, local residents, and animals

Direct contact with surface and subsurface soils is currently possible via dermal exposure of workers and dermal or ingestion exposures of terrestrials. Potential future receptors of surface soil will be residents and terrestrials via ingestion and dermal contact exposure routes.

The potential for infiltration of surface contaminants into groundwater has not been confirmed. There is a confirmed impact on the groundwater in the presence of TCE. However, since this chemical was never detected in the overlying soils, it is not certain that IRP-12 is the source. Since the shallow water is not currently used, exposure of workers and animals is not possible. Future usage of the shallow groundwater may result in the exposure of residents, workers, and terrestrials.

Potential receptors of constituents in stormwater runoff are current and future biota and future local residents via all exposure routes.

Step 2 – Decision That Addresses the Problem

PRINCIPAL STUDY QUESTION

The principal study question contains five parts:

1. Are the parameter values found in the sediment sample taken during the SI representative of the drainage ditch, and is there any vertical migration?
2. Are there any hot spots in the soils at the three storage areas?
3. Has there been any vertical migration of contaminants in the three storage areas?
4. What is the extent (lateral and vertical) of the TCE contamination in the groundwater, and what is its probable source?
5. Have any of the four AOCs released hazardous materials to the subsurface soil?

ALTERNATIVE ACTIONS THAT COULD RESULT FROM RESOLUTION OF THE PRINCIPAL STUDY QUESTION

Exhibit 8 illustrates the decision logic to be used to address the principal study question alternatives outlined below.

1. Are the parameter values found in the sediment sample taken during the SI representative of the drainage ditch, and is there any vertical migration?

The only PCOC detected in the drainage ditch was TRPH. If subsequent sampling demonstrates that this is correct, then the level found will need to be considered to determine if remedial action, such as removing the top layer of sediment is warranted. If other PCOCs are detected, then a risk screening will be performed to determine if remedial action is necessary. A risk screening involves comparison to background if appropriate and comparison to PRGs if available.

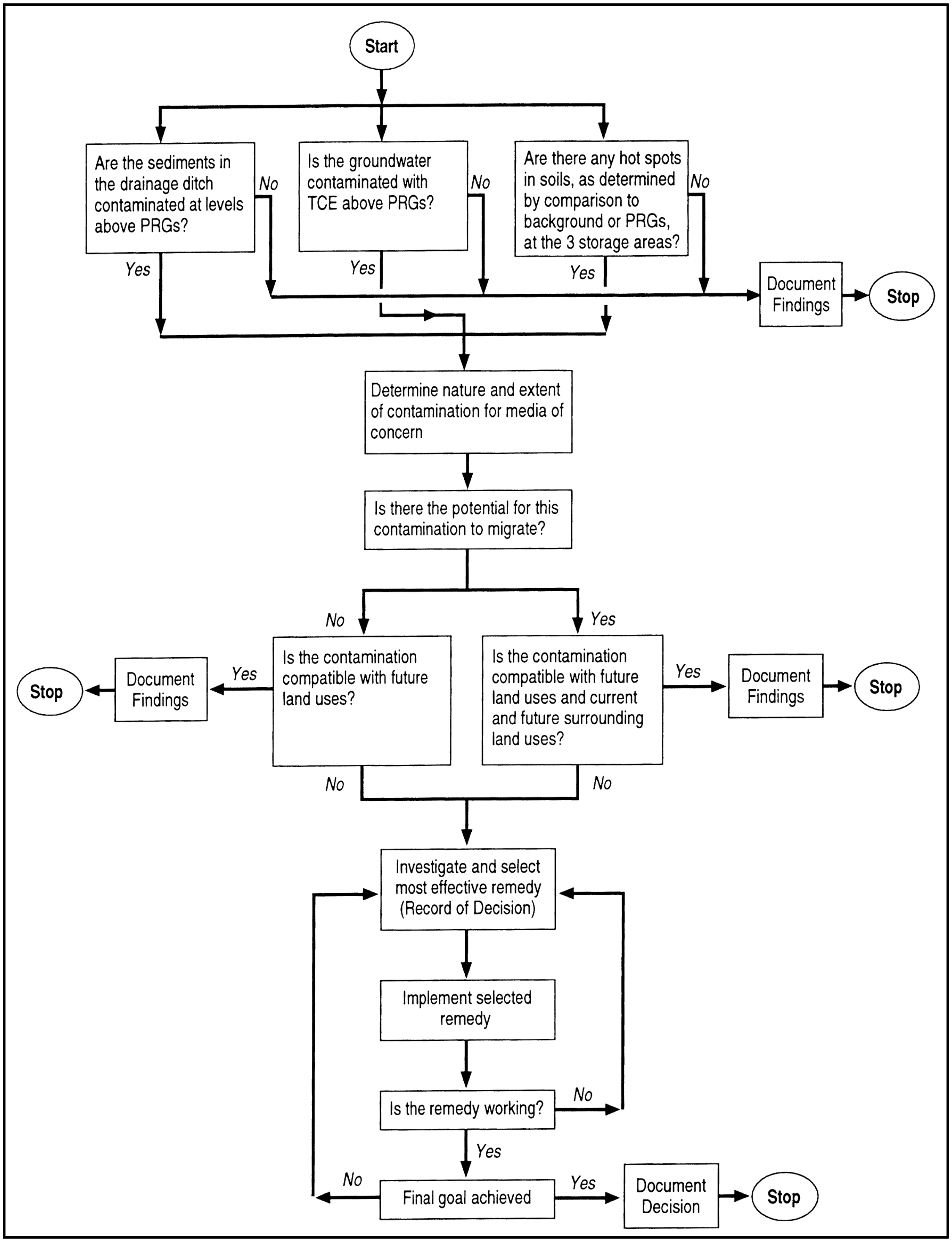
2. Are there any hot spots in the soils at the three storage areas?

The initial data from the random sampling conducted under the SI indicated primarily TRPH contamination. There is some indication that this sampling, especially in the area north of Building 90, may not have been in IRP-12 boundaries. A statistical approach using field screening on a grid that covers a somewhat larger area will be used to answer this question. If hot spots are detected, then the values found will be compared for screening purposes to background if appropriate or to PRGs for a residential scenario to determine if remediation should be considered. Actual cleanup goals will be established in 1995. If no hot spots are found, then the grid approach allows for a statement of certainty and power that will provide the basis for a no further action finding.

3. Has there been any vertical migration of contaminants in the three storage areas?

The SI provided soil data only for the 1-foot horizon. The sampling at depth will determine if there are any PCOCs below this level. If none is found, the grid sampling pattern will allow for a finding of no further action. If PCOCs are found at levels that present a risk, then depending upon the depth and volume involved, a removal action may be recommended before carrying the investigation into the FS stage. Such a removal would result in a finding of no further action for the FS and Record of Decision (ROD). If the contamination is both deep and widespread (an unlikely scenario given the present data), then a full FS will need to be conducted to examine remedial alternatives.

Exhibit 8
IRP-12 Drum Forage Area No. 2: Decision Flowchart



4. What is the extent (lateral and vertical) of the TCE contamination in the groundwater, and what is its probable source?

TCE was detected in a groundwater sample taken by HydroPunch™ in the area north of Building 90. No TCE was detected in any soil samples taken at IRP-12. Hence, its source in the groundwater and the extent of the impact is unknown. The concentration of TCE, if confirmed, indicates the potential for a high concentration source and the need for groundwater remedial action. This remedial action will be evaluated but will probably be carried out within the context of the basewide groundwater program (OU-1).

5. Have any of the four AOCs released hazardous materials to the subsurface soil?

The only information for these AOCs are from the record search. No sampling visit has been conducted. Whether these AOCs have resulted in any subsurface soil or groundwater contamination is not known. Since these AOCs are located within the IRP and covered under the gridded sampling area, any release from them will be detected to the 95 percent confidence level by planned grid sampling. Additional soil borings will be drilled to make the total of four soil borings around each AOC. If contamination is found at any of the AOC, its extent will be determined and remedial action, if needed, will be planned in conjunction with the overall investigation and remedial strategies for the IRP site.

ORGANIZE MULTIPLE DECISIONS

Soil source issues and their removal, if needed, will be addressed first. The resolution of the groundwater issue at IRP-12 will be carried out next. Since the drainage ditch sediments may be affected by the investigation and remedial activities at the site, their remediation, if required, will be done last.

Step 3 – Inputs Affecting Decision

DATA NEEDS TO ANSWER QUESTIONS

Data required to answer the site questions include:

- Vertical and horizontal extent of contamination in soil and groundwater;
- Groundwater flow patterns for the upper aquifer;
- Potential for connection between the first and second aquifers;
- Background concentrations of PCOCs for soil and groundwater;
- Contaminant concentration levels;
- Future/planned land use;
- Identification of cleanup standards; and,
- Technology applicability/limitations.

SOURCES FOR EACH ITEM IDENTIFIED

Vertical and Horizontal Extent of Contamination in Soil and Groundwater

The SI investigated soils to a depth of 1 foot for full chemistry and took soil-gas samples at a depth of 6 feet bgs. Groundwater contamination was detected in the 15- to 25-foot zone. Further delineation will be accomplished by the installation of wells and soil borings and testing the soils and groundwater for contaminants of concern. In addition, the extent of VOC contamination in the groundwater will be investigated by use of HydroPunch™ or similar *in situ* groundwater sampling. Based on the existing data, analysis by an offsite laboratory of a selection of the soil samples for the analytes in Exhibit 9 is proposed.

Soil samples will also be screened by the onsite laboratory for the presence of total recoverable hydrocarbons and VOCs. The results of these tests will aid (identify high and low concentrations of organics in the soil) in selecting the samples to be sent to the offsite laboratory.

Based on the existing data, analysis of groundwater taken from monitoring wells for the following analytes is proposed. The FSP (BNI 1995a) will describe in detail the list of analytes for general chemistry. The TCE contamination problem will be investigated by HydroPunch™ to estimate extent. All these groundwater samples will be screened by the onsite GC. Twenty-five percent of the HydroPunch™ samples will be sent to an offsite laboratory for analysis of chlorinated hydrocarbons.

Groundwater Flow Patterns for the Upper Aquifer

The ANL Phase I study (ANL 1995a) indicated a basewide flow pattern in the aquifer occupying the upper 100 feet of the subsurface to the south-southwest. While local variations may occur for purposes of planning the groundwater investigation, this direction will be assumed.

The Potential for Connection Between the First and Second Aquifers

The ANL Phase II study (ANL 1995b) investigated the interconnective-ness of the aquifers. Preliminary data from the first phase indicate an aquitard occurring at approximately 70 to 100 feet bgs. This aquitard appears to prevent the migration of inorganic chemicals into the lower zone. However, the investigation at IRP-12 must deal with TCE, which due to density factors, has a natural tendency to sink. Therefore, the aquitard and the lack of a vertical gradient may not prevent its deeper migration. At least one series of HydroPunch™ samples must go deep enough to obtain nondetect values of TCE to ensure the extent of vertical migration has been found.

Exhibit 9
IRP-12 – Proposed Chemical Analyses

Parameters	Use	Source	Back-ground	Decision Criteria	Method of Analysis/Comments
Soil					
Volatile Organic Hydrocarbons	DC	Field	MDL	Presence; PRG	EPA Method 8240A
PCBs	DC	Field	MDL	Presence; PRG	EPA Method 8080
PAHs	DC	Field	TBD	Presence; PRG	EPA Method 8310
TOC	DC	Field	MDL	Fate Transport Parameter	EPA Method 9035/36
TAL metals	DC	Field	TBD	Presence; PRG; Background	EPA Methods 6010A and 7000 series
Molybdenum	DC	Field	TBD	Presence; PRG; Background	EPA Method 6010A
Chromium VI	DC	Field	TBD	Presence; PRG; Background	EPA Method 7196A
pH		Field		< 7	
Groundwater					
Volatile Organic Hydrocarbons	DC	Field	MDL	Presence MCL; PRG	EPA Method 8240A
Chlorinated Volatile Organics	DC	Field	MDL	Presence MCL; PRG	EPA Method 8010A
TAL metals	DC	Field	TBD	Presence MCL; PRG; Background	EPA Methods 6010A and 7000 series
Chromium VI	DC	Field	TBD	Presence; Background	EPA Method 7196A
General water chemistry cations and anions		Field	TBD	Fate and Transport	EPA Methods 6010A 9000 series, and 300 series

Acronyms/Abbreviations:

- DC – apply to decision criteria
- Field – data to be collected from the proposed investigation
- MCL – maximum contaminant level
- MDL – method detection limit
- PAHs – polynuclear aromatic hydrocarbons
- PCBs – polychlorinated biphenyls
- PRG – preliminary remediation goal
- TAL – target analyte list
- TBD – to be decided
- TOC – total organic carbon

Background Concentrations of PCOCs for Soil and Groundwater

Background for volatile organics and hydrocarbons in soil will be assumed to be non-detect. Background for pesticides and metals will be determined for the base in a separate effort. Background for any organic compound of concern in groundwater will be assumed to be nondetect. Background for metals and other naturally occurring constituents in groundwater will be established in the basewide background groundwater monitoring program. This program will also establish the presence of any nonnatural organic that may be migrating onto the base and, hence, is unrelated to base activities.

Contaminant Concentration Levels

Contaminant concentration levels will be determined through a combination of onsite screening to estimate extent (volatile organic contamination and petroleum hydrocarbon contamination) and offsite commercial laboratory analysis. Analytical methods are selected to reflect the value needed for risk assessment purposes by comparing the MDLs of the analytical tests available with published risk-based or regulation-specified limits. Tables reflecting both the various MDLs and the risk required levels are found in the QAPP (BNI 1995c).

Future/Planned Land Use

IRP-12 is currently listed as residential.

Identification of Cleanup Standards

PRGs published by U.S. EPA Region IX have been identified for IRP-12 in the CTM (BNI 1995b). These will be updated as needed and used for screening purposes. Final cleanup goals will be negotiated in 1995.

Technology Applicability/Limitations

A preliminary identification of potential applicable technologies, their limitations, and the data required to be collected to evaluate them has been prepared in the CTM (BNI 1995b).

Step 4 – Boundaries of the Study

CHARACTERISTICS THAT DEFINE THE POPULATION OF INTEREST

PCOCs are as specified in Step 3 in groundwater and soil. Also of concern are classes of chemicals that were expected to be found but were not detected.

SPATIAL BOUNDARY

Unless screening data indicate differently, the spatial boundary for the soil investigation is the area marked on Exhibit 3 as the boundary of the IRP to a depth of approximately 12 feet bgs. Deeper soil samples will be taken if contamination is evident at 12 feet.

The SI indicated TCE contamination in the groundwater north of Building 90. HydroPunch™ data or an equivalent *in situ* method will be used to estimate the extent of the contamination. Degreasing operations have occurred on the northern side of Building 533, which borders IRP-12 on the north. The ANL (1995a) Phase I study indicates a southerly groundwater flow direction in this area. This potential source will have to be investigated as part of the RI. Groundwater samples taken from the HydroPunch™ will be screened at the onsite laboratory for VOC contamination. A subset (25 percent) will be sent to an offsite laboratory for confirmation. The data gathered from the HydroPunch™ effort will be used to set the locations of groundwater monitoring wells. The exact areal extent of the investigation cannot be predicted at this point since the source is not known. The investigation will begin near the location where TCE was detected by the SI and extend outwards (towards the degreasing operation) and downwards until the plume is defined.

TEMPORAL BOUNDARY

The soil and HydroPunch™ investigation will occur during the RI field effort. The groundwater monitoring effort will be part of the overall basewide groundwater monitoring program and will include 4 quarters of data collection coincident with that of the other monitoring wells onsite.

SCALE OF DECISION MAKING

Soil

Previous investigations have identified very few PCOCs in the shallow soil of the site. The purpose of this investigation is to determine the lateral and vertical extent of this contamination and determine if any hot spots exist. Historical evidence would indicate that the lateral extent is limited. Twelve feet bgs was chosen for the vertical depth as it is the depth defined by RCRA as being the deepest that can be used to estimate surface soil risk. As this depth is very close to the first water encountered, it will also allow for ready estimation of intermedia transfer potential.

Groundwater

Previous investigations have indicated the presence of chlorinated organic contamination and limited heavy metals impact in the very shallow groundwater at the site. Given this, it is very difficult to delimit a scale other than to specify TCE as the indicator parameter and scale the investigation to track its presence.

Step 5 – Decision Rule

PARAMETER OF INTEREST

Soil

The SI data only detected TRPH above screening levels. Since this area is relatively small, the purpose of this investigation is to determine the extent of the TRPH and identify any hot spots that might have occurred from leaking drums that may have contained other PCOCs. This entails locating the areas where these PCOCs are individually above screening levels and determining if remediation is necessary. Eventual clean closure is the goal (if technologically and financially feasible). Therefore, the investigation is not concerned with the statistical methods to define a “true” value or mean but rather presence. The question to be asked will be: Are organic parameters present and, if so, do they exceed PRGs or background? The question for metals and other inorganic parameters will be: Do they exceed PRGs, other values defined by regulation, and background?

Groundwater

For groundwater the parameters of interest are volatile organics (primarily TCE) and selenium. Volatile organics are not defined as naturally occurring for the base and hence any detection means a base-related impact. The purpose of the investigation is to estimate the extent of all base-related organic contamination to determine both its risk and to evaluate remedial technologies if needed. Statistical analysis of the results of the field program will not be performed to estimate risk and extent.

SCALE OF DECISION MAKING

See Step 4.

ACTION LEVEL

Preliminary action levels for screening purposes are set to PRG levels and background. Background will be determined during the basewide investigation using currently available data. PRG and other regulatory action levels for the various media are found in the QAPP (BNI 1995c).

No statistical evaluation of the analytical results for the IRP data is proposed. Background levels for pesticides, PAHs, and naturally occurring parameters for groundwater and soil will be determined statistically. Comparison of data for purposes of determining if the constituent is above background at the discrete location taken will be done on a one-on-one basis.

For contaminants not found naturally in the environment, raw data or a single validated detection for each analyte will be used for comparison with the decision criteria. The individual sample concentrations, if found to be higher than the 95th percentile of the background concentration, will be considered indicative of contamination (SWDIV 1993b).

DECISION RULE

Soil

The horizontal and vertical extent of contamination will be defined as the locations where the measured concentrations of any base-related PCOC exceeds the applicable PRG or other specified regulatory standard. The extent of contamination will be similarly defined for naturally occurring PCOCs for which one or more sample concentrations exceed the 95^{th} percentile of the appropriate background concentration. It should be noted that the extent of contamination will not necessarily be coincident with the area requiring cleanup but in general will be somewhat larger. In addition, it is expected at this site that the soil contamination will either not require remediation or if so the extent will be such as to allow for an early removal action.

Groundwater

The horizontal and vertical extent of contamination will be defined as the locations where the measured concentrations of all of the anthropogenic PCOCs exceed the applicable MCL or other specified risk-based standard. The extent of contamination will be similarly defined for naturally occurring PCOCs for which one or more sample concentrations exceed the 95^{th} percentile of the appropriate background concentration. Once the spatial limits and concentrations of contaminants are established, the baseline risk assessment, RI, and FS will be completed.

Step 6 – Limits on Uncertainty

The Navy proposes a soil investigation approach that serves multiple purposes and is aimed at providing support to a number of cleanup-related decisions. The systematic sampling design pattern is a combination of an unaligned grid (large cells with a random sample) and three regular grids (smaller cells with samples collected at the center of the grids). These samples will be used to approximate the areal extent of contamination, identify hot spots, and provide useable data for risk assessment. The sampling approach as proposed includes a large number of soil samples to provide statistical confidence and to satisfy all requirements of the one-phase investigation for potential soil contamination.

Different limits of uncertainty are associated with both the systematic sampling pattern and the purpose of the statistical analysis to be performed.

The areas covered by the larger grid cells (60-foot spacing) provide the basis for identifying a hot spot of 30 feet in diameter with an 80 percent probability (Gilbert 1987). These areas are at the boundaries of the study area, and the potential of contamination is minimal. The areas within IRP-12 where the SI has already detected PCOCs are covered by finer grids. The centers of these grids (sampling locations) are spaced at a 20-foot distance from each other. A hot spot with a 12-foot diameter can be identified by this grid with a probability of 95 percent. In areas where contamination is suspected but not known, a 30-foot grid is used. A hot spot with an 18-foot diameter can be identified by using this grid with a probability of 95 percent.

Summary statistics and simple tests of normality performed on 12 samples from IRP-12 from existing SI data for seven PCOCs (TRPH, arsenic, lead, copper, chromium, zinc, and pH) provided insight about the variability and type of the statistical distribution of these PCOCs.

The results of the statistical evaluation of the SI data indicated that the assumption of normality can be used at this stage to identify limits of uncertainty and the variability in the data. Both the limits of uncertainty and estimates of the variability are needed to evaluate the adequacy of the proposed number of samples for screening and for risk assessment purposes.

The proposed sampling plan for IRP-12 provides a maximum of 250 screening samples. The analytical results of 10 percent, i.e., a maximum of 25, will be used to confirm the results from the screening.

The highest estimated CV for the site from SI data (based on TRPH data) is 63. Using a worst-case scenario of a CV exceeding 60 and the most conservative approach of using the mean concentration in risk assessment implies that the proposed number of samples will satisfy the two following limits of uncertainty:

- the probability of declaring that the site is not posing any risk to human health when it is contaminated will be 5 percent (95 percent confidence) or lower; and
- the probability of characterizing the site as posing a threat to human health when it is not contaminated will be 20 percent or lower (80 percent power).

Step 7 – Optimize the Design

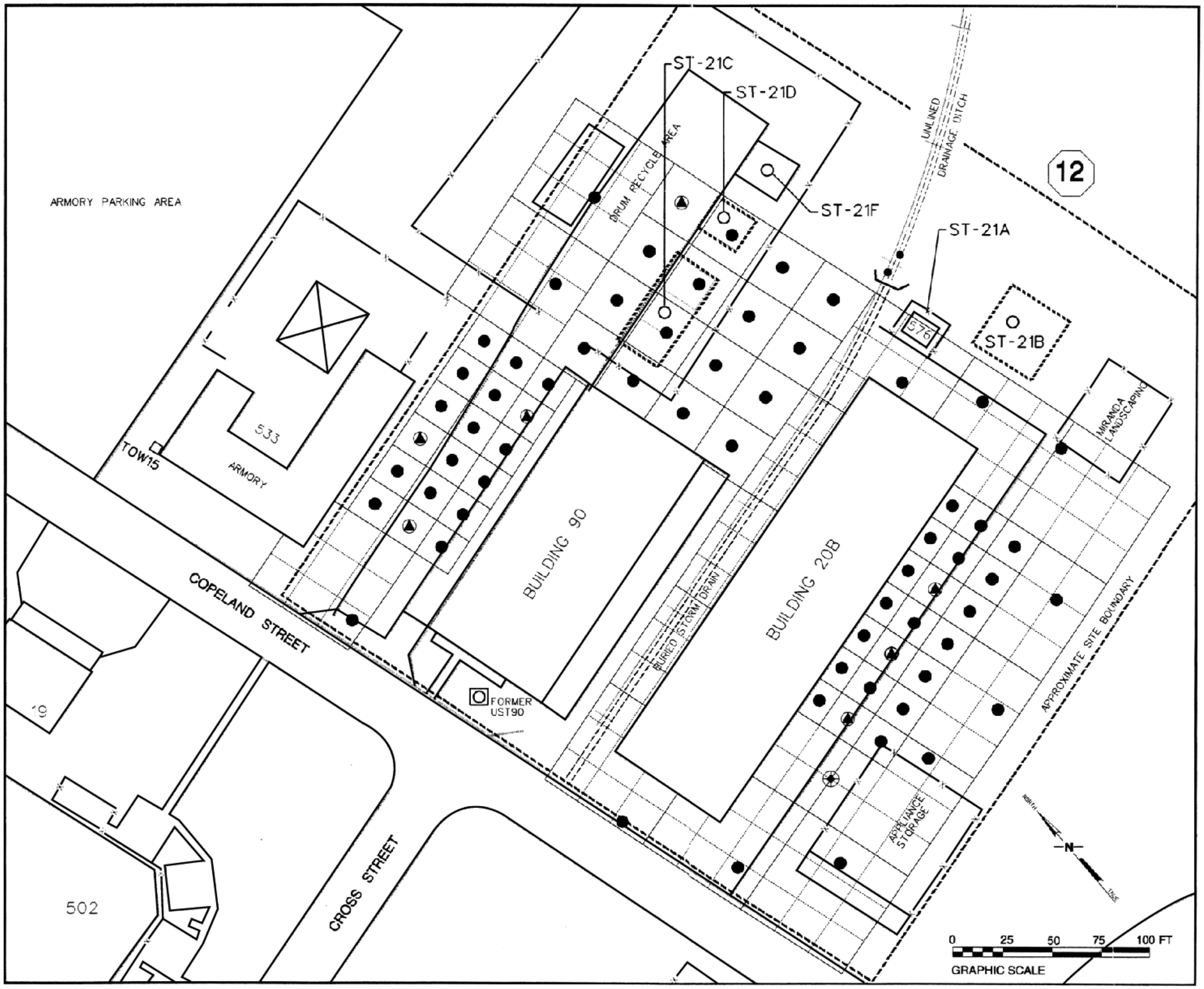
Data from the limited random sampling of the SI showed very little potential contamination in the soil with none of the expected contaminants present. The objective of the RI fieldwork for soils will be to confirm this and further confirm a lack of hot spots. In order to accomplish these goals, the Navy proposes to overlay the three potentially contaminated areas and the four AOCs with a grid based on 60-foot centers. For statistical purposes the initial grid overlay will be based on a randomly chosen point. In those areas where contamination is known the 60-foot grid is further subdivided into 20-foot centers. In areas where contamination is suspected but not known the grid size is reduced to 30-foot centers. For those areas not tested by the SI but included in the site boundaries, a randomly generated sampling point will be located within the 60-foot-square grid box (see Exhibit 10). Additional borings will be drilled in the vicinity of each AOCs to bring the total soil boring in the vicinity of each AOC to four.

Two judgmental samples are proposed for the sediments of the drainage ditch. They will be collected at the surface and between 1 and 3 feet. The soil borings, drilled by using a hollow-stem auger or EnviroPunch™, will be sampled at 0.5- to 2.5-, 6- to 8-, and 10- to 12-foot depth intervals.

The split-spoon will be opened after each sampling and a subsample taken in duplicate from the spoon. The sample location will be based on the geologist's professional judgment as to the most likely location to find contamination. This technique allows for observation of the 2-foot sample length for staining as well as the ability to choose the best textured soil within the spoon. (If the EnviroCore™ is utilized, continuous cores will be available for inspection by the geologist and additional samples may be taken at his/her discretion.)

One of the duplicate soil samples will be tested for TRPH and volatile organics at the on-site laboratory. Ten percent of the samples will be sent to an

Exhibit 10
Initial Sampling Locations at IRP-12



offsite laboratory for confirmation analyses. One-third of these confirmation analyses will be for soil samples testing on the low to nondetect end of the screening, while the other two-thirds will be from the soil samples containing the highest concentrations detected during screening. Given the number of screening samples to be taken, the 10 percent number should generate at least as many samples as a conventional approach and since the offsite laboratory numbers can be compared with the values gotten with the screening instruments they will also give an indication of contamination of those samples not sent to the offsite laboratory. A sample with TRPH hits will be tested for TAL metals and molybdenum, PAHs, and PCBs (EPA Method 8080). A sample that has only VOC hits will be tested for volatiles using EPA Method 8240 and TAL metals and molybdenum. One sample showing high contamination that has been taken at the end of a sampling day will also be tested for cyanide and chromium VI. This will aid in meeting the holding time requirements for these analysis and should provide data from at least six separate soil locations and several horizons. All soil samples shipped to the laboratory will be tested for pH.

Several samples will be selected by visual identification of their texture for laboratory measurement of cation exchange capacity, bulk density, moisture content, grain size distribution (sieve analysis), and TOC analysis to aid in fate and transport analysis and remedial technology evaluation. Soil-gas analysis is not proposed as the expected soil textures are clayey, which is unfavorable to soil-gas analysis.

Monitoring wells completed as part of the CS at IRP-16 (SWDIV 1993c) are just to the east of IRP-12. When tested in 1992, these wells were generally not contaminated. However, MW-4, which lies to the northeast of the site and downgradient to slightly crossgradient of the degreasing operation north of Building 533 contained 35 Fg/L of TCE. If usable, these wells may be tested as part of the overall base groundwater investigation, which will include quarterly sampling for 1 year.

In addition, the presence of TCE in the groundwater must be confirmed and its vertical and lateral extent estimated. This will be accomplished through the use of HydroPunch™ starting in the general vicinity of the SI HydroPunch™ that detected TCE at 21 feet bgs. Groundwater samples will be taken from the 20- to 30-foot range, the 40- to 50-foot range, and if needed, from the 70- to 80-foot range (above the aquitard indicated by the ANL study). The deeper samples will be obtained by the use of a dual-tube air percussion rig. Duplicate water samples will be collected for volatile organic analysis. One sample will be tested immediately at the onsite laboratory to determine if the borehole needs to be further advanced to take a deeper sample. A nondetect by the field GC will stop the drilling. The duplicate sample will be sent to an offsite laboratory for analysis by EPA Method 8010. If contamination is found in a given HydroPunch™ sample, another series of samples at other locations will be collected (Exhibit 10). To the north, a sample will be collected just to the south of Building 533 and if found to be contaminated, a northerly direction will be pursued until a nondetect for TCE is found. At this point up to four well pairs will be installed to provide for a groundwater monitoring network for IRP-12. The depths of the pairs will depend upon the extent of TCE contamination discovered with the HydroPunch™.

If the soil screening of samples taken from the area east of Building 90 indicates contamination in the 10- to 12-foot horizon, then the drilling algorithm will be changed to take the remainder of the samples to groundwater. The same sampling protocol as described above for the area north of Building 90 will be used (see decision rule diagram of Exhibit 8).

In the area to the south of Building 20B, one *in situ* groundwater sample taken during the SI contained elevated levels of selenium. Therefore, selected soil borings will be taken to groundwater for *in situ* sampling (Exhibit 10). If groundwater contamination is confirmed from the judgmental sampling, additional HydroPunch™ investigation will be carried out to delineate the extent of (horizontal and vertical) contamination. Details on this investigation are described in the FSP (BNI 1995a). The samples will be field-filtered and sent to an offsite laboratory for TAL, molybdenum, and general water chemistry anion analysis. Volatile organic analysis on unfiltered water samples from these three holes will also be conducted. No wells are planned in this area. As with the area east of Building 90, if the field screening of the soil samples taken at the 10- to 12-foot horizon indicates organic contamination, that boring will be taken to groundwater and samples of the soil and groundwater taken for screening and analysis.

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