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Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

EPA

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TITLE: DRAFT--SITE INSPECTION SAMPLING STRATEGY TO SUPPORT HRS SCORING

APPROVAL DATE: JAN. 7, 1986

EFFECTIVE DATE:

ORIGINATING OFFICE: OERR

☐ **FINAL**

☒ **DRAFT**

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Originator Information

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Lead Office

- [ ] OUST
- [X] OERR
- [ ] OWPE
- [ ] OSW
- [ ] AA-OSWER

Approved for Review

Signature of Office Director	Date

Title

DRAFT Site Inspection Sampling Strategy to Support HRS Scoring

Summary of Directive

Guides the SI team in developing a sampling plan that leads to an appropriate HRS score for the site. Describes some relevant selective characteristics of the HRS and how these characteristics affect where to collect samples.

Type of Directive *(Manual, Policy Directive, Announcement, etc.)*

Guidance

Status

- [ ] Draft
- [ ] Final
- [X] New
- [ ] Revision

Does this Directive Supersede Previous Directive(s)? [ ] Yes [X] No

Does It Supplement Previous Directive(s)? [ ] Yes [X] No

If "Yes" to Either Question, What Directive *(number, title)*

Review Plan

- [ ] AA-OSWER
- [ ] OUST
- [ ] OECM
- [ ] Other *(Specify)*
- [X] OERR
- [ ] OWPE
- [X] OGC
- [ ] OSW
- [X] Regions
- [ ] OPPE

This Request Meets OSWER Directives System Format

Signature of Lead Office Directives Officer	Date
Nancy Livingstone	12/11/85

Signature of OSWER Directives Officer	Date
Sherry Fielding	12/12/85

EPA Form 1315-17 (10-85)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN - 7 1986

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Comment on Draft Sampling Strategy to Support HRS Scoring

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response

TO: Director, Office of Emergency and Remedial Response
Region II
Director, Air & Waste Management Division,
Regions III, IV, VI, VII, & VIII
Director, Toxics & Waste Management Division
Region IX
Director, Hazardous Waste Division
Region X

Attached is a draft strategy for how to select appropriate sampling locations during a Site Inspection (SI). We would appreciate your review and comments on this guidance by February 15.

I feel very strongly about the need for this guidance. Our quality assurance review of Regional and State PA/SI programs and discussions with Regional and FIT staff suggests many of the SI's that have been done by States and FIT fall significantly short of the goal of developing data to support a valid HRS score (for NPL eligible sites). It appears that a series of SI's occur before a valid HRS score is developed. It is my firm conviction that with proper background data collection and rigorous application of this sampling strategy at the first SI, the quality and usefulness of the first SI will improve. In addition, this should substantially reduce the number of times when it is necessary to revisit sites, which ultimately will reduce the time between when a PA is performed and when a valid HRS score is developed.

If you have any questions on this guidance, please call Lucy Sibold of my staff at 8-382-2454.

Attachment

cc: Don Smith
Rick Spear
Perry Katz
Butch Byer
Jon Johnston
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DRAFT

SITE INSPECTION SAMPLING STRATEGY
FOR
SUPPORTING HAZARD RANKING SYSTEM SCORING

December, 1985

Discovery and Investigation Branch
Office of Emergency and Remedial Response
U.S. Environmental Protection Agency

SITE INSPECTION SAMPLING STRATEGY TO SUPPORT HAZARD RANKING SYSTEM SCORING

TABLE OF CONTENTS

SITE INSPECTION SAMPLING STRATEGY
TO SUPPORT HAZARD RANKING SYSTEM SCORING

TABLES

SITE INSPECTION SAMPLING STRATEGY
TO SUPPORT HAZARD RANKING SYSTEM SCORING

FIGURES

SITE INSPECTION SAMPLING STRATEGY TO SUPPORT THE HAZARD RANKING SYSTEM SCORING

1.0 INTRODUCTION

The site inspection (SI) is part of the Superfund pre-remedial site evaluation process and serves to fulfill a number of purposes. The two most important of these are to: 1) understand the potential threat posed by a site--to the extent possible within the limited scope of the SI--and 2) to determine the need for further Superfund activity at a hazardous substance site.

For a site to be eligible for Superfund remedial funds it must be listed on EPA's National Priorities List (NPL). The primary way for a site to be eligible for inclusion on the NPL is determined by assessing the site's relative risk potential through the Hazard Ranking System (HRS) model. The SI is the step in the site evaluation process which enables the field investigators to collect data to support the HRS. This strategy is designed to identify and guide the SI team in developing a sampling plan that leads to an appropriate HRS score for the site.

It is <u>not</u> the intent of this strategy to suggest limiting sample collection only to that which is necessary for HRS scoring. Overall, SIs should assess potential, immediate, and direct threats posed by a site (beyond the HRS needs), support emergency response activities, fulfill public information needs and otherwise provide information on special site conditions at an early time in the site evaluation process[1]. While doing so, the sampling plan should include those samples necessary to support HRS scoring. This strategy is intended to define <u>only</u> the types of samples needed to properly apply the HRS to a site.

The goal of this SI sampling strategy is to provide field staff with a framework of logic for selecting appropriate sampling points and to prepare SI sampling plans with a focus on developing data to support the HRS. Using this logic will (1) reduce the total number of samples collected, (2) minimize the number of occasions where sites need to be resampled and (3) reduce the total cost of the effort. In the past, samples were collected during the SI without full appreciation of their relevance to the HRS scoring. Often, informative data resulted from the sampling effort, yet the data were

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1 The SI is not an extent-of-contamination study nor a full risk assessment study. These efforts are accomplished during the remedial investigation (RI) which is initiated after a site is listed on the NPL.

not useable in scoring the site. At the same time, sampling data essential to the HRS scoring were not developed and it was common to later revisit the site to collect samples to develop the appropriate HRS score. Proper understanding of the HRS and some of its basic characteristics will reduce the number of unnecessary samples and the need to revisit sites for additional samples. It will also minimize the number of false negatives--that is, samples taken at sites that may threaten health and the environment but which, due to inadequate planning, do not produce a score reflective of the site's risk. Overall this strategy will shorten the time and reduce the cost required to evaluate the site for its eligibility for remedial funds.

To plan SI sampling it is important to understand the characteristics of the HRS. Prior to undertaking an SI the person preparing the sampling plan should develop an initial HRS score. This initial HRS score will identify data gaps and, therefore, indicate where sampling and other information is needed to strengthen or further substantiate the HRS score.

As a general rule, the HRS score developed for a particular site should accurately represent the site's conditions, rather than a score which just clears the NPL eligibility HRS score of 28.50. Although the scores are not necessarily a true measure of risk at each site, they are useful for understanding the relative risk of a site compared to others. A legitimately high scoring site should list high on the NPL. Although EPA can initiate remedial action at lower scoring sites, higher scoring sites may receive higher priority for the next phase of activity.

Because one of the primary objectives of the SI is to support the HRS, the sampling strategy differs from traditional approaches to environmental sampling. Traditional approaches usually emphasize the collection of samples which represent the average contamination in the nearby environment. For effective HRS scoring, it is important to show releases to the environment. To verify these releases, samples which are representative of the released materials rather than of the general environment should be collected. Samples representative of a release are those which demonstrate hazardous substance migration from the site. For example, it would be more productive to collect a sample at the surface of a body of water if the constituent of concern is less dense than water and tends to float on the surface. More traditional sampling approaches might suggest that a sample be taken over the entire depth of the stream rather than the surface. Taking a sample at the surface would document a release rather than describe the average environment.

The following section presents the strategy for identifying samples which will optimize HRS site scoring. The strategy is presented as a set of sampling principles. These principles are intended to guide the development of a sampling plan. In the subsequent section, a ficticious case history is also presented which demonstrates how the principles might apply in developing an SI sampling plan.

2.0 SI SAMPLING STRATEGY PRINCIPLES

There are six principles which should be considered when planning SI sampling activities. These six SI sampling strategy principles are:

- Principle 1: Target Samples to Determine Maximum Population Exposed or Proximity to a Sensitive Environment
- Principle 2: Collect Sufficient Background to Preclude Contributions from other Sources
- Principle 3: Minimize On-Site Sampling
- Principle 4: Set Priorities for On-Site Samples
- Principle 5: Demonstrate that Release has Occurred
- Principle 6: Sample for Air Releases

Each of these is presented with relevant applications. Taken together, these principles provide the framework for a more detailed site-specific sampling plan.

2.1 Principle One: Target Samples To Determine Maximum Population Exposed or Proximity to a Sensitive Environment

There are two characteristics associated with the HRS that significantly influence the score of a site. First, for a site to score at all on a particular migration route, a target population or environment must exist within a specified maximum distance of the facility. Second, within that target distance, the site progressively scores higher the closer the target receptor is to the facility. In CERCLA, the definition of "facility" means any place where a hazardous substance is placed or comes to be located. This means that the "facility" includes the site where waste was stored or disposed <u>plus</u> any off-site contamination attributable to the site. Therefore, even if the target population is a considerable distance from the site, it can be within the maximum target distance from the place where the site's waste comes to be located. In effect, the off-site contamination extends the facility's boundaries and may bring within the scoring range, a target population or sensitive environment. As discussed in the introduction, this underscores the need to know in advance of conducting field activities, the location and proximity of target populations and environments. Table 1 presents, for each HRS contaminant migration route, the maximum distances within which each target must reside in order for it to score for that route.

Table 1. Maximum Target Distances For Each HRS Route

	HRS ROUTE	TARGET	MAXIMUM TARGET DISTANCES
1.	Ground water	Population served as water supply or irrigated land.	3 miles
2.	Surface water	Population served as water supply or irrigated land	
		. Downstream	3 stream miles
		. Static water body	1 mile
		Sensitive environment	
		. ≥ 5 acre coastal wetland	2 stream miles
		. ≥ 5 acre freshwater wetland	1 stream mile
		. Critical habitat of an endangered species or a National Wildlife Refuge.	1 stream mile
3.	Air	Population in vicinity	4 miles
		Sensitive environment	
		. ≥ 5 acre coastal wetland*	2 miles
		. ≥ 5 acre freshwater wetland*	1 mile
		. Critical habitat of an endangered species.**	1 mile
		Land use	
		. Commercial/industrial area	1 mile
		. National/State park, forest or wildlife reserve	2 miles
		. Residential area	2 miles
		. Agricultural land in production in past 5 years	
		- Average land	1 mile
		- Prime land	2 miles
		. Historic or landmark site	within view

* Wetland is defined by EPA in 40 CFR Part 230, Appendix A, 1980

** Endangered species are only those designated by the U.S. Fish and Wildlife Service.

There may be a trade-off to undertaking sampling to identify how close the facility's off-site contamination is to the target. The farther away the sampling is from the site, the less likely contaminants will show up above detection limits. Therefore, sampling farther away is more uncertain. Also, the more distant the samples are from the site, the greater the possibility that alternative sources of contaminants could interfere with producing definitive results. However, if sufficient analytical resources are available, it may be cost-effective to add an additional sample(s) to better understand the extent of off-site contamination and accordingly help develop the proper HRS score.

The following discussion demonstrates the impact and application, of this principle to each of the HRS migration routes.

Ground Water

The focus of sampling ground water should be to tie in a potential ground water target population to the site. The target population is defined as the number of individuals who live, work, go to school or others who would regularly use the water within a three-mile radius of ground water contamination attributable to the site being investigated. Figure 1 illustrates the types of populations that may be considered targets via ground water migration.

The ground water, surface water and air targets are each handled differently in the HRS and accordingly, these differences affect how one would select where to sample. In the HRS scoring for ground water migration, the population served[2] by wells within three miles is combined in a matrix with the distance to the nearest well.[3] In many cases the nearest well may not be the source of water for the majority of the population served within three miles. For example, the nearest well may serve one person one mile away while a large, municipal well may serve thousands of people two-and-a-half miles away. These two factors are evaluated separately before they are combined in a matrix for a score assignment. In evaluating the

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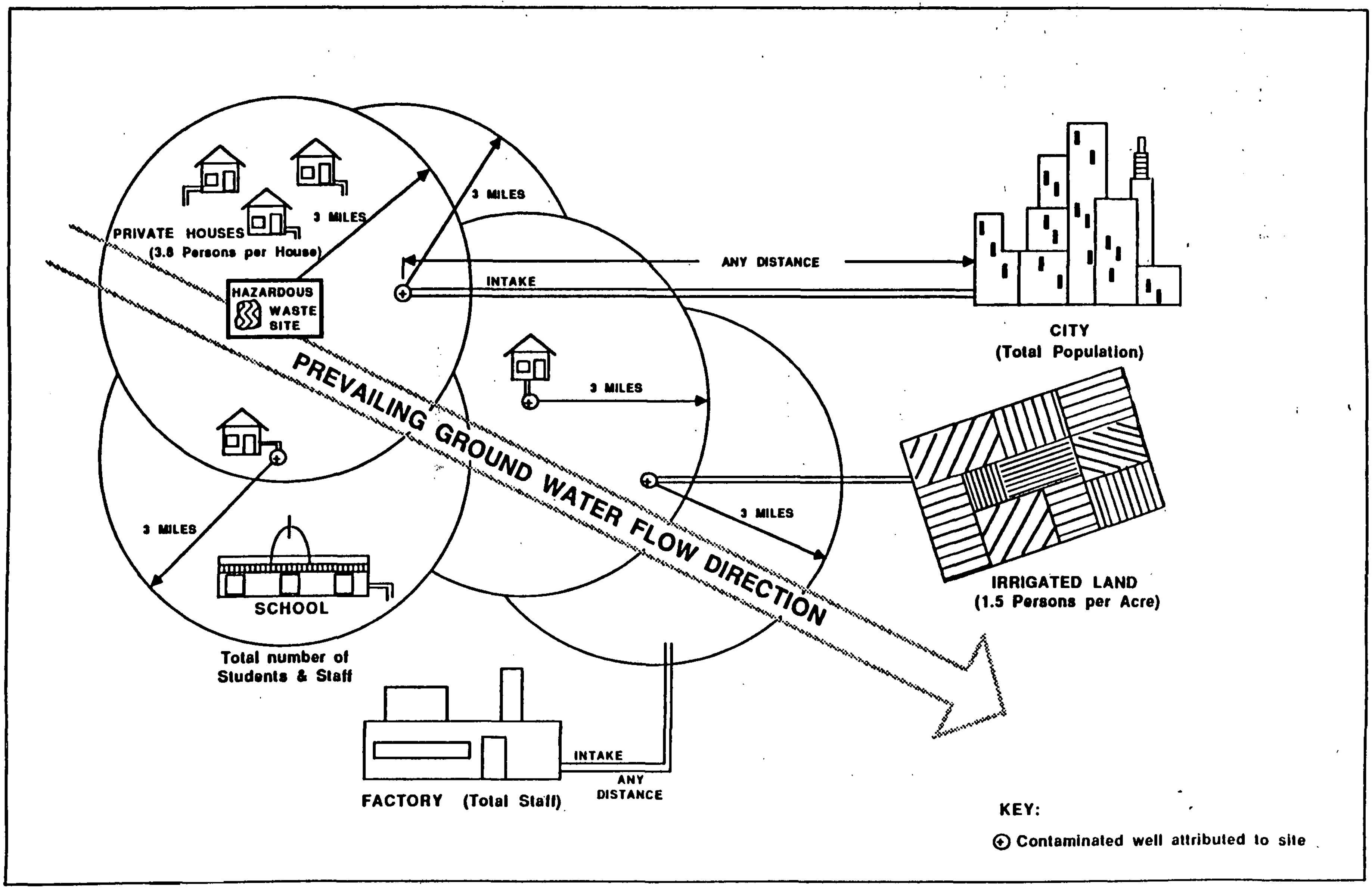
2 The "population served" need not be located within three miles of the contamination, but must receive their drinking water from a ground water source located within the three miles. This point is illustrated in Figure 1 by the factory, the city and the irrigated land.

3 To be considered in the HRS the "nearest" well must be either a drinking or irrigation well. Monitoring and industrial wells are not considered.

Figure 1. Ground Water - Potential HRS Exposure



nearest well and the population served, both of these must be within three miles of the nearest point of contamination for the factors to "score" at all.

To apply this to identifying sampling points for ground water, first locate the nearest well and other wells serving the largest population. If these wells are more than three miles away from the facility, draw a three mile radius around the wells. Next, select ground water sampling locations that are within three miles of the wells and in the direction of the source site. The samples should be located either at the wells or between the site and the wells. Figure 2 graphically depicts this approach. It is worth noting that this approach will work most often for wells that are downgradient of the site. Upgradient wells and samples are not as likely to show detectable levels of contaminants unless (1) the well has a sizable drawdown to influence gradient flow or (2) the well is inside the three-mile cut-off radius. If contamination is found, at the sampling location, the wells are considered within 3 miles of the "facility" and could be included in HRS scoring.

It is also noteworthy that in the HRS, the shorter the distance to the nearest well, the higher the score for that factor. However, the same does not apply to the distance to the wells serving the majority of the population. The site's score does not increase by further reducing the distance to the well(s) serving the majority of the population. This means that sampling to determine if contaminants have migrated even closer than three miles to the nearest well, may be worth the effort. Sampling to determine if the distance between the contamination and the well serving the majority of the population is less than three miles is not worth the effort (for HRS data collection purposes).[4] The thresholds in the HRS model at which the score changes for the distance to the nearest well, are:

- three miles
- two miles
- one mile
- .38 miles (2000 feet).

It is important when sampling ground water to have a general understanding of the local hydrogeology. Often, there are two or more aquifers that are used in the same area. Depending upon the

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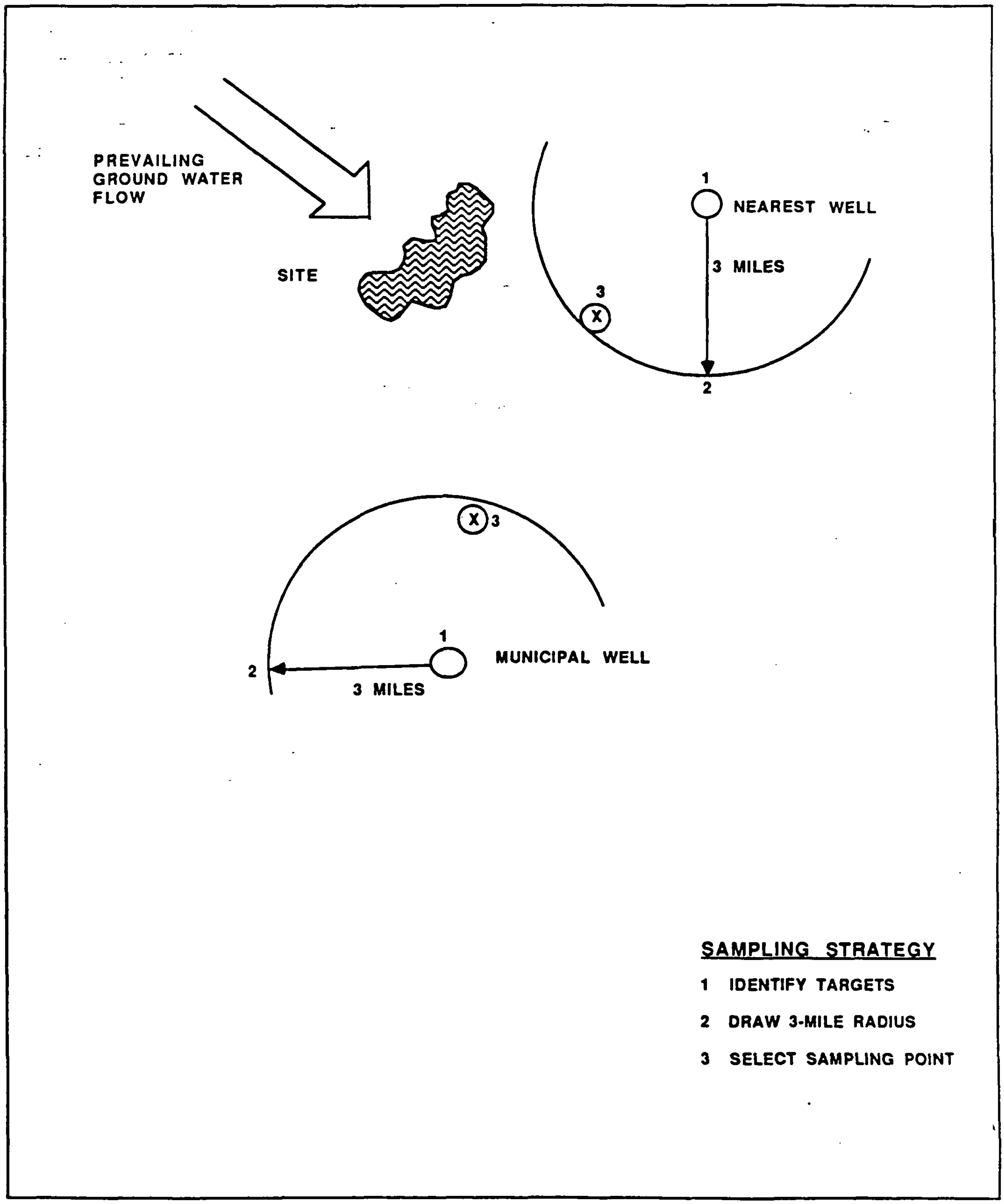
4 It is worth restating here that though it may not be of any particular value to collect a certain sample for the purpose of scoring a site, it may be of value in evaluating the site for emergency response or to better understand the threat posed by a site.

Figure 2. Ground Water Sampling Strategy



population using each aquifer, the aquifers can produce significantly different scores. Thus, prior to sampling, each aquifer needs to be evaluated separately to determine which aquifer will yield the highest HRS score. The highest scoring aquifer is likely to be the one serving the greatest population within the maximum target distances and the one having the nearest well. This is referred to in the HRS as the "aquifer of concern".

Surface Water

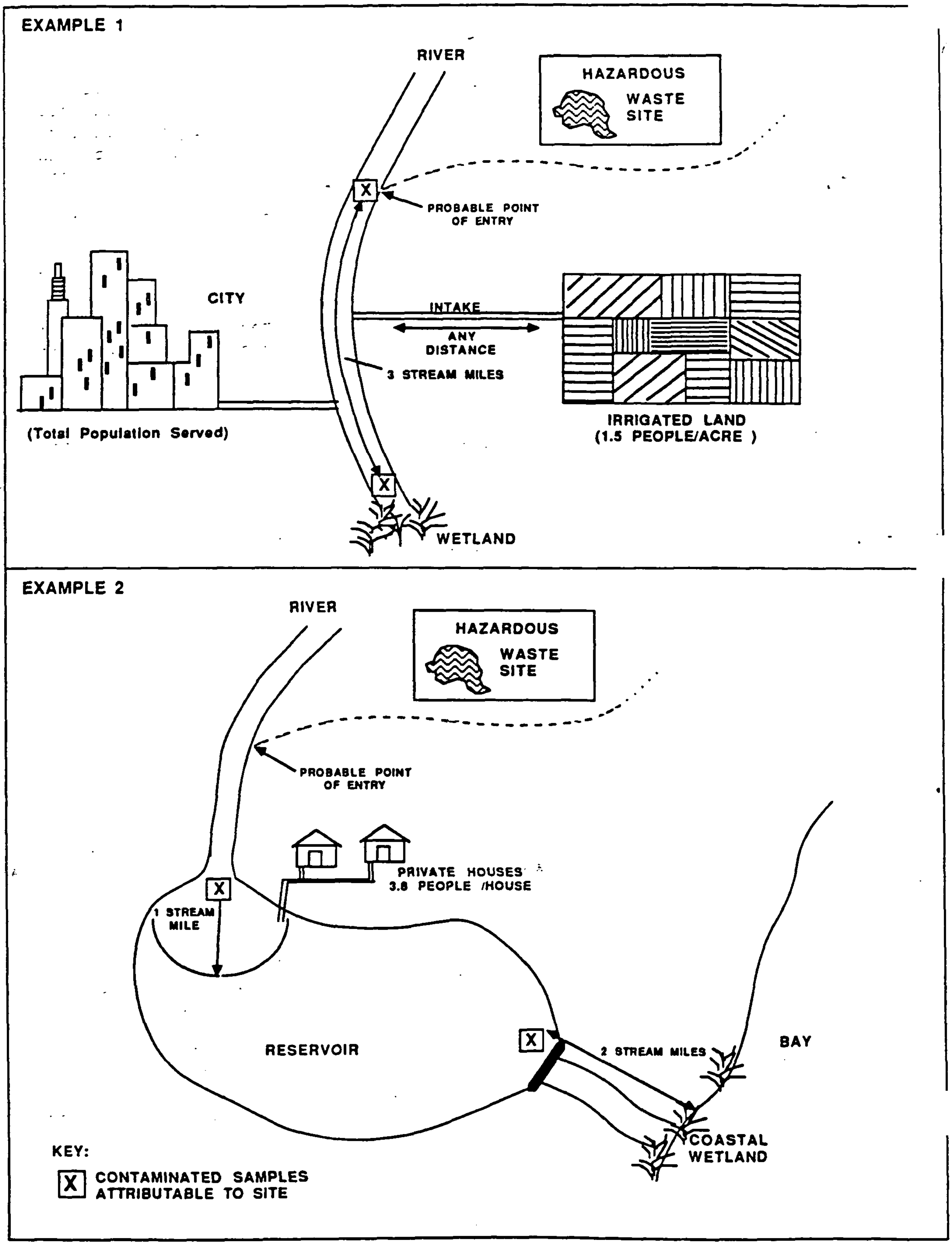
The objectives and rationale of surface water sampling are similar to ground water except that the target is not limited to population served but also includes sensitive environments. In the surface water route it is possible to tie in a target population that is more than three miles downstream from the site (source of disposition), if it can be established that contamination from the site has migrated to within three miles of the target. As with the ground water route, the facility boundaries are, in essence, extended to the point of contamination. To apply this to surface water, first, search for potentially exposed human populations, critical habitats and National Wildlife Refuges. Second, go back three miles from the target along the migration route and then select a sampling point just within those three miles.

When sampling along the surface water route, careful consideration should be given as to which phase of the surface water route should be sampled--the aqueous phase or sediment phase. This decision depends upon the physical properties of the most toxic, persistent and mobile compounds handled by the facility. Certain compounds are more likely to be found in sediment than the aqueous phase.

Table 1 indicates the three categories of sensitive environments which are considered by the HRS. These are both coastal and fresh water wetlands (five acres or larger) and critical habitats of an endangered species or a National Wildlife Refuge. The maximum distances these targets may be from the site or from contamination associated with the site, in order for the target to score, are also indicated in Table 1. For the HRS, these distances must be measured along the pathway the contaminants migrate (i.e., stream miles), not the straight line distance.

Figure 3 consists of two examples which illustrate the type of target receptors that may be considered for HRS scoring. Example 1 indicates sampling points for a nonstatic surface water source (river) which serves as a water supply for a city and irrigated land. As was true for the "population served" by ground water, only the water intakes must reside within the maximum target distance not the population using the surface water. Both the city and the irrigated

Figure 3. Surface Water - Potential HRS Exposure



land have water intakes within three stream miles of contamination attributable to the site; the water is used, however, a long way away. Example 2 demonstrates sampling points for a static water body (reservoir) and a coastal wetland.

Within the three mile cut-off, the score for the population served increases with decreasing distance between the intake to the probable point at which the site's contaminants enter surface water. Therefore, sampling to determine if contaminants have migrated to a distance less than three miles is useful. The thresholds in the HRS model at which the score changes for the distance to the nearest water supply intake are:

- two miles
- one mile
- .19 miles (1000 feet).

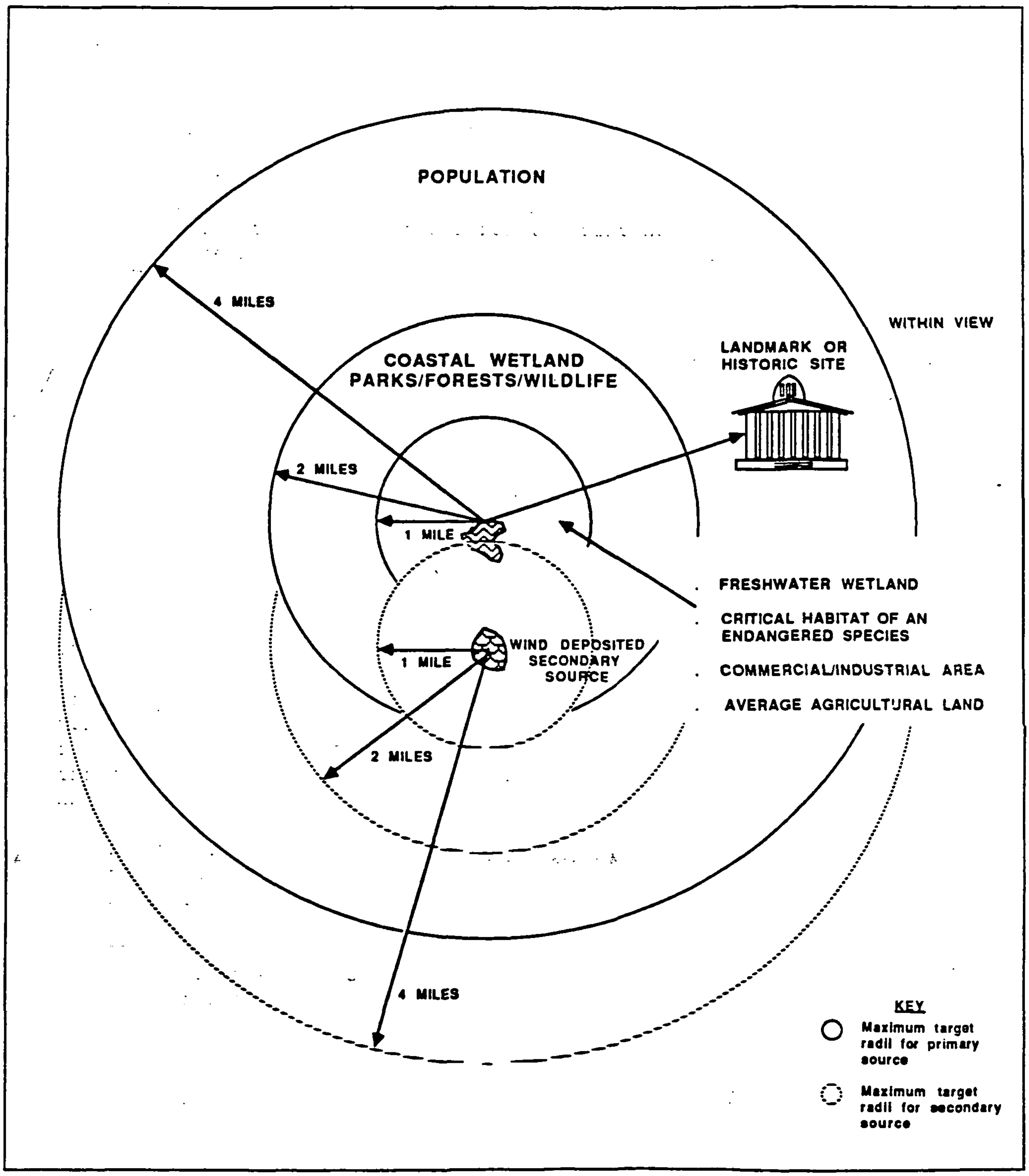
Thus, these radii define three concentric zones of equal scoring factors surrounding the contamination source.

Air

For the air route, it is difficult to determine if facility boundaries are extended to some point off-site because of the difficulty in measuring air releases. Site boundaries are sometimes extended where there is an accumulation of substances off-site attributable to the site. Because extension of site boundaries is rarely possible, the primary goal of air sampling (or monitoring using portable instruments) is to show that the material of concern is released to the ambient air. If the material is shown to release, then all targets within a four mile radius of the source can count for HRS scoring.

The population potentially exposed to an air release source is counted as the persons residing within the maximum radius of four miles, including workers in factories, offices, restaurants, motels or students, regardless of wind direction when samples are being collected. Maximum target distances along the air route to sensitive environments and other critical land uses can be found in Table 1. Figure 4 graphically indicates the type of receptors that are considered in the HRS. The diagram also shows a situation where there is a secondary contributing source. Because this secondary source can be attributed to the site, targets within a 4 mile radius of this secondary source can be counted for HRS scoring.

FIGURE 4. Air - Potential HRS Exposure



To show that a volatile or particulate substance is releasing, therefore, sampling or monitoring (using portable monitoring instruments) should generally be performed on site. All sampling (or monitoring) should be conducted in the vicinity of the suspected source but not next to, suspected sources such as drums, well heads, leachate pools or contaminated soils. No disturbance of the site which would affect sample results is allowable and samples should be taken in the ambient air and in the "breathing zone". The "breathing zone" is defined as the height above the ground where air is normally breathed by a potentially exposed population.

The best approach for air route sampling usually requires an understanding of waste types on-site. The most air-dispersable substance (volatile or particulate) should be identified and sampling should occur both upwind and downwind. If there is no wind on the day sampling occurs, it may be possible for particuilate releases to collect dust samples from rafters or air vents at locations which are predominantly downwind of the potential source, in places where no mechanisms other than air could account for their transport. Soil samples generally do not qualify for air sampling since it is possible that contaminants migrated via foot traffic or other non-air transport mechanisms.

2.2 Principle Two: Collect Sufficient Background to Preclude Contributions from Other Sources

In the HRS, it is essential to demonstrate that a release above background has occurred. This is done by collecting analytical evidence which reflects the normal background levels of selected hazardous substance. In most cases, these background levels are below detection limits. The background samples should be collected upgradient, upstream or upwind from the source. Figure 5 shows some example background sample collection locations.

As a practical matter, background samples should always be collected. However, there are some situations where background samples may not be necessary. These include:

- Hazardous waste deposited in the water table,
- Leachate from site observed flowing into creek, or a
- Photograph of a dust cloud from waste piles and of field personnel gathering dust samples.

These situations are considered direct evidence of a hazardous substance release which requires no further evidence of contamination or background levels.

A second kind of background sample are those which discriminate among alternative sources of the contamination. Within a given area there are often other possible sources of a particular contaminant. It is important to establish through sampling that at least some of the contaminants observed are from the facility of interest. In some cases, where there is another source, it must be clear that the contamination from the facility of interest is in addition to the contribution from the "other" facility. Figure 5 also shows some sampling locations which will discriminate among other potential sources. Traditionally, insufficient attention has been given to the collection of background samples, making it difficult to evaluate contributions from other sources of the contamination. The background samples that are commonly overlooked are those needed for every new stream entering a river (migration pathway) between the site and downstream contaminated samples. These background samples must be collected to identify whether there is contamination originating from tributary sources.

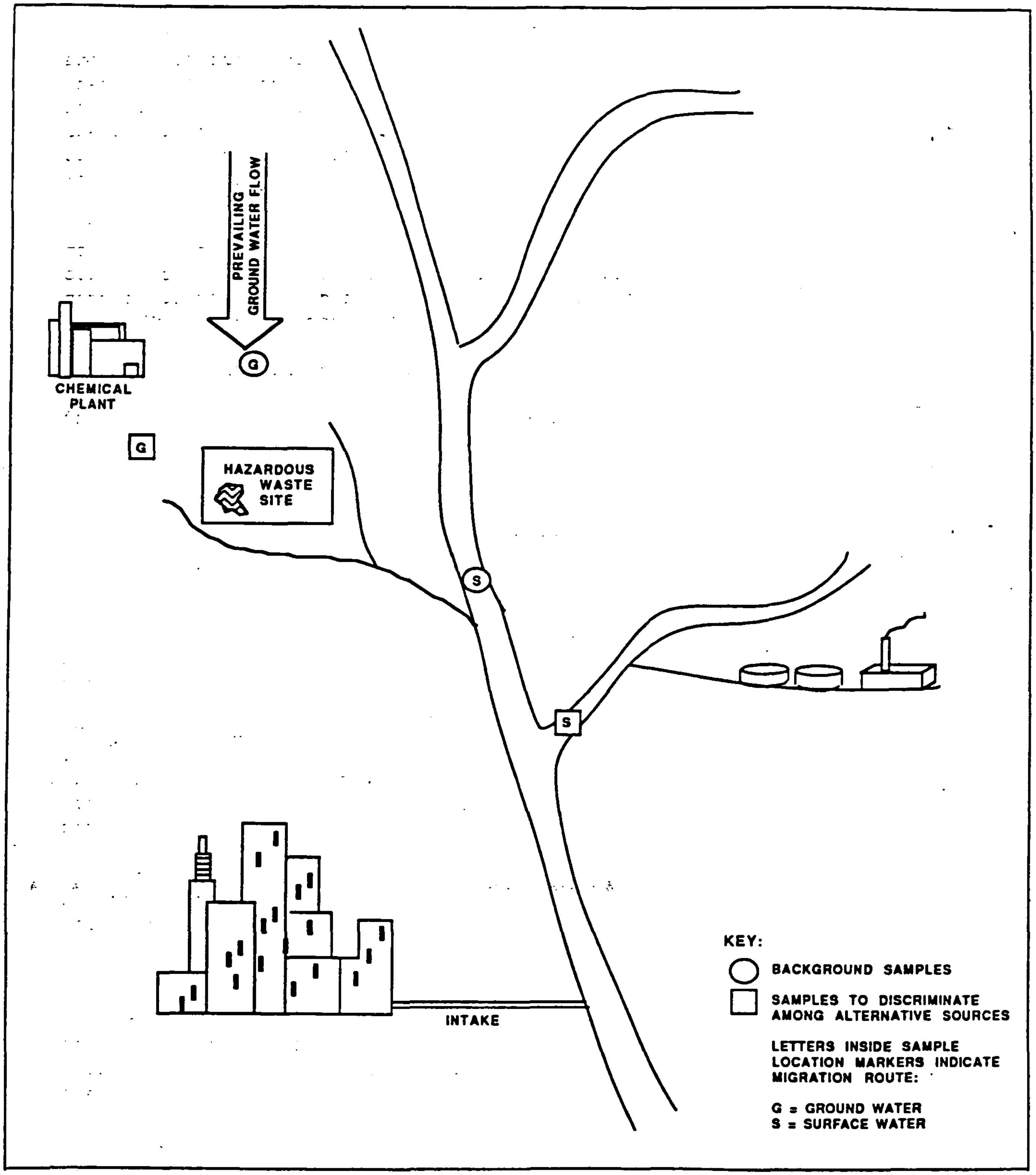
2.3 Principle Three: Minimize On-Site Sampling

Under the HRS, it is essential to establish and document the types of waste handled on the site to determine the appropriate score for toxicity and persistence and for the volume of waste handled on-site. In the absence of the proper documentation, the site may receive a score but it will probably be lower than it would be with good data. This type of information is also important to properly tie the wastes handled on the the site to contamination found off-site. In the past, the tendency has been to take most of the samples on the site. This may not be necessary since often there are existing data showing the type of waste handled at the facility. Sometimes these data are found in owner/operator records, generator records, permit application data, and compliance inspections. Although analytical data are preferred, other records identifying specific contents or constituents of waste may be adequate. For example, there may be well-maintained manifest records or other documents which specifically identify the nature of the wastes handled on the site. If these specific data exist, then it may not be necessary to sample on the site. These samples may be better applied to establishing off-site releases. Where waste identification data do not exist or are not reliable, then it will be necessary to sample on-site.

Old lagoons and decaying bulk tanks are often good candidates for sampling. Samples from visibly contaminated soils in drum storage areas are often more useful and less dangerous than a sample from any one of the drums or samples from a number of the drums.

In cases where little is known about the site's previous operating practices and no obvious, distinctive "units" exist to sample, sampling in the areas where wastes are most likely to collect are more likely to provide information on the type of waste previously handled. These areas might include on-site ditches, pools, sinks,

Figure 5. Example HRS Background Samples For Ground Water and Surface Water



drainage pipes or other similar features. Random and non-random composite grid sampling is another approach to identifying the type of waste handled at a site where little is otherwise known.[5] Equal volumes of samples would be collected from selected grid locations and then combined and homogenized. A portion of the sample would be removed for analysis. Although precise identification of the location of contaminants is not possible with this technique, positive results are indicative of the type of waste handled at the facility.

2.4 Principle Four: Set Priorities For On-Site Samples

When selecting what to sample on the site, two characteristics associated with the waste should be evaluated. They are: the toxicity/persistence of the waste, and the physical state of the waste. First, toxicity/persistence of the waste should be considered.[6] Appropriately, the HRS gives greatest weight to the more toxic and persistent compounds on a site. Therefore, the focus of any onsite sampling should be on the more toxic/persistent wastes. Second, the physical state of the waste should be evaluated. Ingeneral, all other things being equal, the more mobile the physical state of waste, the higher the value assigned because of its greater tendency to migrate. Liquids, gases and sludges score higher than powders or fine materials. Unstabilized or unconsolidated wastes score the lowest.

Sometimes, these characteristics can conflict with one another. For example, the most toxic and persistent compounds may be the solids and unconsolidated wastes. In this case, it would be appropriate to evaluate how these characteristics will affect the score for the site and structure the sampling accordingly. In the rare situation where little to nothing is known about the waste, the more mobile wastes--liquids, gases, sludges, powders and fine materials--should be sampled.

2.5 Principle Five: Demonstrate That Release Has Occurred

Sampling should provide direct evidence of a hazardous substance release via any of the three HRS migration paths potentially affected. To do this, a contaminant must be measured at a significantly higher level than the background level, regardless of frequency. For HRS purposes, the phrase "significantly higher" relates only to the concentration or amount of material released; it

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5 Sample compositing should be done only for environmental samples, not medium or high concentration samples where reactions between non-compatible wastes could harm field investigators or lab personnel.

6 For air contaminants, only toxicity and not persistence can be evaluated.

has no bearing on the environmental or health effects of the release. It is not relevant, in determining whether a release has occurred, that the release is below regulatory recommended action levels. If the concentration or amount of a release is significantly above the concentration or amount in the background, then it qualifies as a release under the HRS.[7]

To show that a release has occurred in each of the media, the sampling plan should specify, at a minimum, collection of one sample downgradient and immediately adjacent to the suspected source of contamination. For ground water, this would be the closest downgradient well that is completed in the aquifer that serves the largest affected population within 3 miles. For surface water, this would be the most probable point at which waste enters the surface water. For air, the sample would be collected at a reasonable distance downwind. These may be the single most important samples for demonstrating whether or not a release has occurred in the absence of any other evidence. These become especially important as the concentrations of contaminants in samples collected further away begin to fade. It is also essential if there is another contributing source. There must be a preponderance of evidence that the facility is contributing to the off-site contamination.

2.6 Principle 6: Sample for Air Releases

Determining if there is a release of hazardous substances via the air route is one of the most neglected factors in sampling, yet it has the potential for substantially affecting the population and the score of a site. At a minimum, during a site visit, air monitoring should be undertaken for volatile compounds. The instruments used routinely for monitoring for personnel safety and protection can, with little additional effort, be used to evaluate air releases for HRS scoring. Instrument readings should be taken upwind and downwind of the source suspected to be releasing.[8] The readings should be taken at a

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7 A release above background is an indication that hazardous substances are not being controlled and, if the site qualified for the NPL, remedial studies will probably be needed to determine the risks involved and appropriate corrective actions.

8 Procedures for air sampling must include continuous monitoring of wind direction throughout the monitoring period. This approach is not valid if there is any significant change in wind direction. Procedures should also specify collection of air samples or monitoring in the breathing zone.

reasonable distance from the suspected source. They do not have to be taken off-site; however, they should not be taken immediately next to the source. Figure 6 graphically depicts this concept. The source should not be disturbed by sampling personnel while monitoring for releases. For example, drums should not be opened, soils disturbed or the source tampered with in any way. It also must be clear that the releases reported are not methane releases. Methane is specifically precluded from consideration under CERCLA. Therefore, monitoring instruments not sensitive to methane or procedures to evaluate whether the releasing compound(s) is methane should be used.[9] The sampling plan also should specify sampling of the waste to show that it contains a specific hazardous volatilizing compound.[10] This will further substantiate that the release of measure is a hazardous compound.[11]

3.0 EXAMPLE CASE HISTORY

Figure 7 presents a hypothetical situation where an appropriate SI sampling strategy is being employed. Each of the selected sampling locations is discussed in Table 2 in terms of the SI sampling principles which were described in the previous section.

Although the usefulness of one example is limited, the situation described by Figure 7 and Table 2 clearly demonstrates how these sampling principles can be combined to prepare a responsive and efficient sampling plan. Figure 7 indicates that only 12 samples were collected. For other sites, this may not be adequate but will depend on the specific character of the site.

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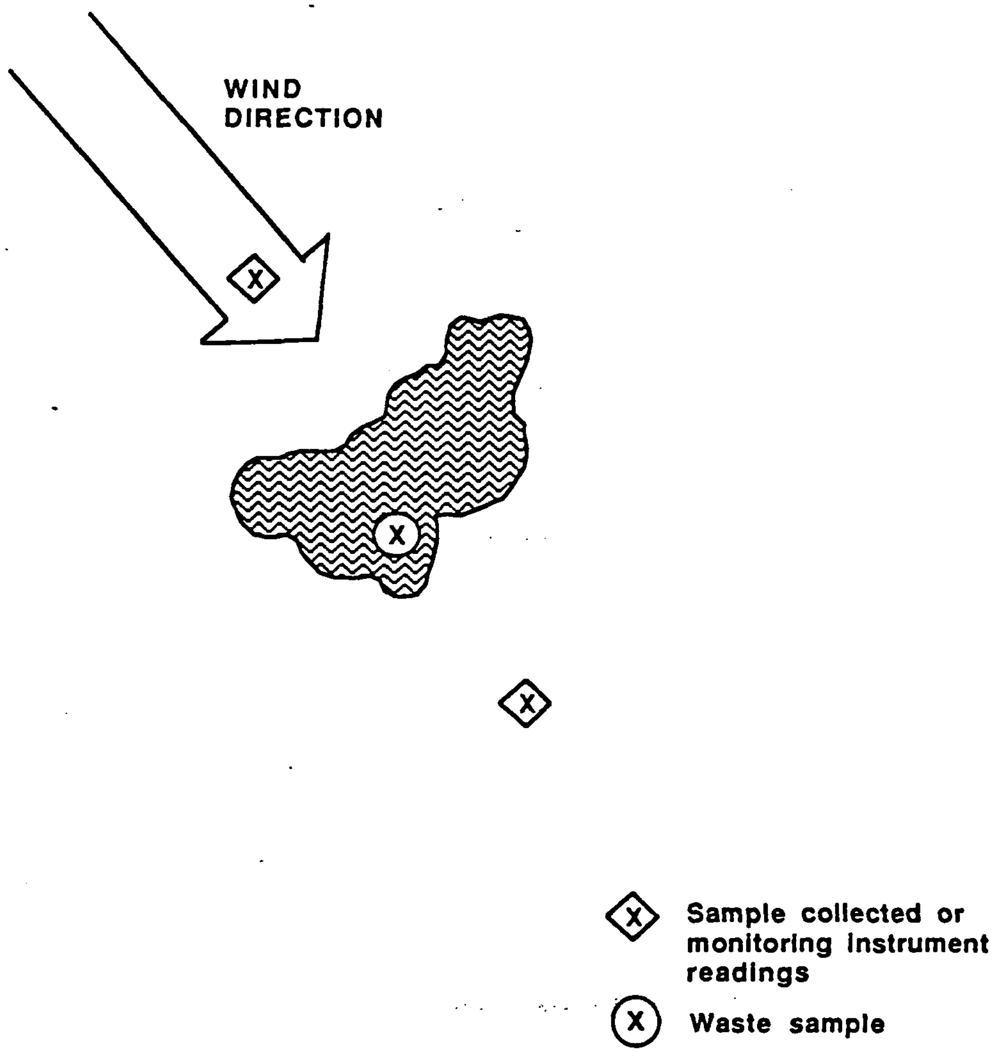
9 For example, the OVA has a carbon filter diversion feature or carbon filter probe adaptation that can be used to determine if the substance being released is methane.

10 Colorimetric indicator type tubes may be used to document that the volatilizing compound has a hazardous component. The collecting media should be specific for the compounds of concern and not be sensitive to a host of other compounds, some of which may be nonhazardous.

11 This procedure for identifying a specific volatilizing hazardous compound in the source material is necessary because the portable instruments do not distinguish between volatile compounds; they merely tell the user that some volatile compound is present, not its identity or its absolute concentration.

Figure 6. Air Monitoring



For HRS scoring, samples or instrument measurements should not be taken at or in drum openings and in areas physically disturbed by samplers. A site that is disturbed by field sampling personnel does not reflect ambient conditions.

FIGURE 7. FICTICIOUS CASE STUDY

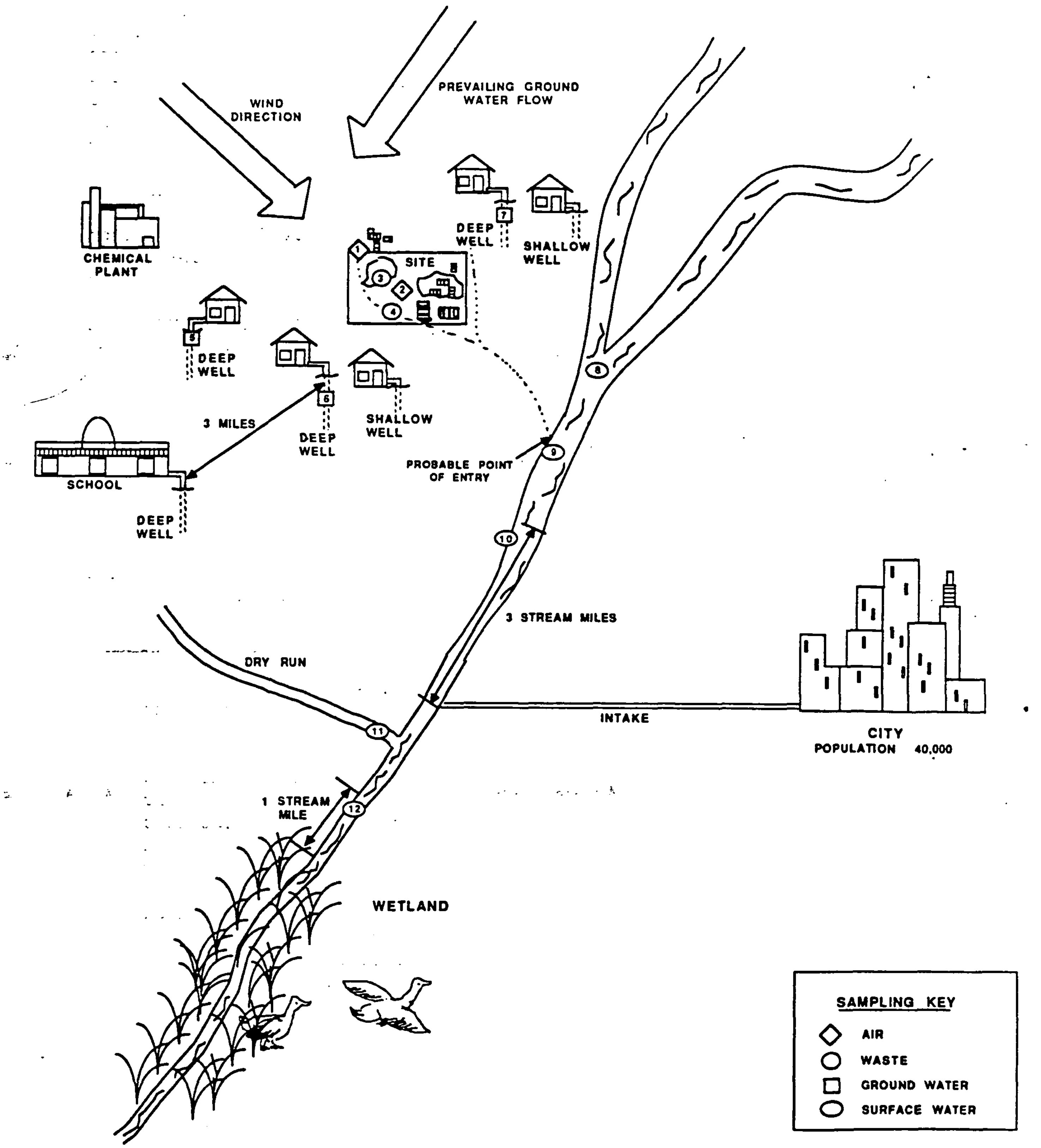


Table 2: Application of Sampling Principles to Sampling Points Identified in Figure 7.

SI SAMPLING STRATEGY PRINCIPLE	SAMPLE NUMBERS
Principle 1: Target Samples to Maximize Population Exposed or Proximity to a Sensitive Environment	6, 10, 12
Principle 2: Collect Sufficient Background to Preclude Contributions from Other Sources	1, 5, 7, 8, 11
Principle 3: Minimize On-Site Sampling	3, 4
Principle 4: Set Priorities for On-Site Sampling	3, 4
Principle 5: Demonstrate that a Release has Occurred	2, 6, 9
Principle 6: Sample for Air Releases	1, 2

4.0 CONCLUSION

The SI sampling strategy consists of six principles which, taken together, should form the basis of SI sampling plans. One of the primary objectives of SI sampling is to collect data to support the HRS. The most effective and responsive sampling plans are developed after a thorough evaluation of existing data and a preliminary HRS scoring.

The SI sampling strategy should be used to guide field personnel in sample collection activities. With a standardized approach to sampling, fewer samples for each site should be required. Moreover, there should be less need for SI-followups and fewer samples sent for analyses.