Module 6:
PA Scoring: Soil Exposure

EPA
United States
Environmental Protection
Agency

6-1

Soil Exposure Pathway

- ♦ **Targets coming into direct contact with hazardous substances**
- ♦ **Contaminated soil and accessible site wastes are evaluated**
- ♦ **Includes gravel, waste piles, asphalt, contaminated flooring and concrete (not limited to soil)**

◆EPA   6-2

Notes

◆ **Targets coming into direct contact with hazardous substances:** This pathway evaluates actual exposure to hazardous substances in contaminated soil and site sources. It requires the presence of hazardous substances on the property of targets and within 200 feet of an area of observed contamination. Observed contamination is defined as the presence of a hazardous substance in the top two feet of soil or in site sources at a level significantly above background.

◆ **Contaminated soil and accessible site wastes are evaluated:** This pathway evaluates contaminated soil as wells as site wastes and sources that are accessible. Contaminated soil is defined as areas of observed contamination. Contaminants in the soil must be attributed to the site.

◆ **Includes gravel, waste piles, asphalt, contaminated flooring and concrete (not limited to soil):** This pathway also includes other contaminated media, such as gravel, waste piles, asphalt, contaminated flooring and concrete. It is not limited to strictly soil.

◆ **This answers the question from Module 2 about evaluating contaminated concrete for the soil exposure pathway.** Contaminated surficial material within the top 2 feet of the surface can be evaluated as long as samples are available to document that the material is contaminated.

   » The soil exposure pathway is based on chemical analysis; therefore, stained concrete will need to be sampled to document that contamination is present. This is different from evaluating contaminated soil that is below a layer of uncontaminated concrete or asphalt.

Site Assessment Questions for Soil Exposure Pathway

♦ **Is there observed contamination?**

♦ **Do people live, go to school or work on property with observed contamination and within 200 feet of an area of observed contamination?**

　　» On property and within 200 feet key point

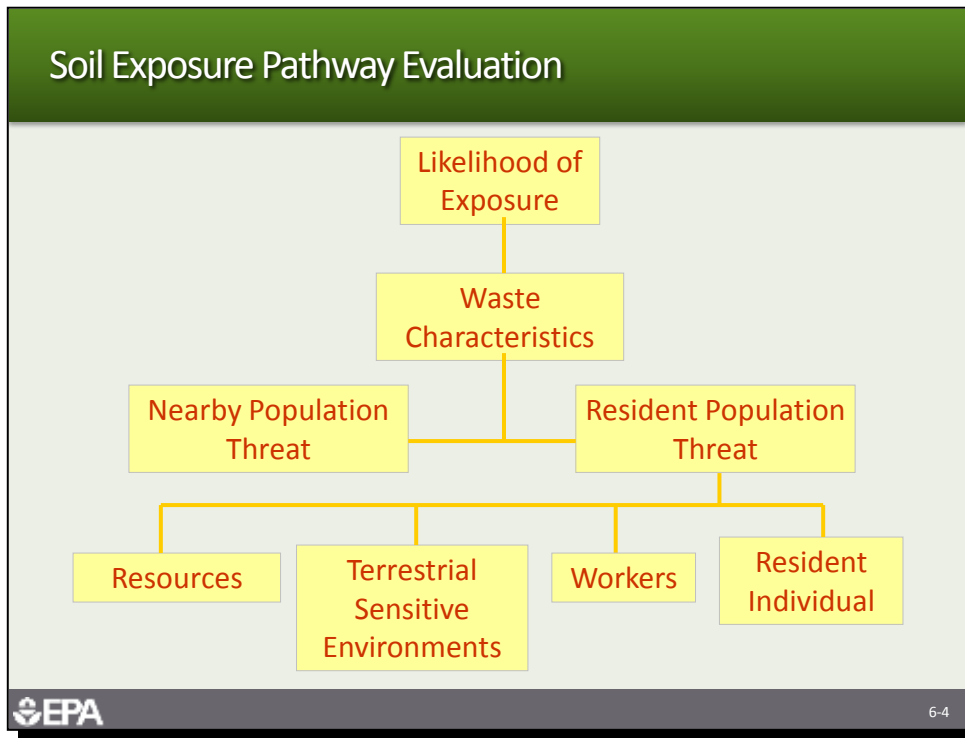♦ **Are there terrestrial sensitive environments located on soil with observed contamination?**

€EPA   6-3

Notes

◆ **Is there observed contamination:** The site assessment should conclude through analytical evidence whether or not there is observed contamination attributable to the site. Observed contamination is established when a hazardous substance attributable to the site is present in the top two feet of soil at a level three times the background level for the site. Background sampling is important for this pathway.

◆ **Do people live, go to school or work on property with observed contamination and within 200 feet of an area of observed contamination:** The PA should hypothesize on whether or not there are people living, going to school or work, or going to day care **on property with observed contamination and within 200 feet** of an area of observed contamination. The SI should test the PA hypothesis through analytical data.

◆ **Are there resources or terrestrial sensitive environments located on soil with observed contamination:** The PA should identify any resources or terrestrial sensitive environments located on soil with observed contamination. Resources and specific types of terrestrial sensitive environments are considered targets for the soil exposure pathway.

Soil Exposure Pathway Evaluation

```
                    Likelihood of
                      Exposure
                          │
                        Waste
                    Characteristics
                          │
      ┌───────────────────┴───────────────────┐
  Nearby Population                    Resident Population
      Threat                                Threat
                          ┌──────────┬─────────┬──────────┐
                      Resources   Terrestrial  Workers   Resident
                                   Sensitive             Individual
                                  Environments
```

⊕EPA   6-4

Notes

◆ **Soil exposure pathway evaluation:** The soil exposure pathway evaluates the likelihood of exposure as opposed to the likelihood of release. Waste characteristics consider toxicity and hazardous waste quantity of the areas of observed contamination. Two threats are evaluated; the nearby population threat and the resident population threat.

Likelihood of Exposure

- ♦ **Areas known or suspected to contain hazardous substances not covered by an impenetrable cover or more than 2 feet of clean cover material**
- ♦ **Not limited to soils; evaluate all sources**
- ♦ **If one sample from a non-soil source type shows observed contamination, the whole source is an area of observed contamination**
- ♦ **Consider mechanisms to transport hazardous substances to nearby properties**

♻EPA   6-5

Notes

◆ **Areas known or suspected to contain hazardous substances not covered by an impenetrable cover or more than 2 feet of clean cover material:** The likelihood of exposure should consider all areas associated with the site that are known or suspected to contain hazardous substances and that are not covered by an impenetrable cover or more than 2 feet of cover material.

◆ **Not limited soils; evaluate all sources:** Despite its name, this pathway evaluates all sources at the site, including those that do not fall into the contaminated soil category.

◆ **If one sample from a non-soil source type shows observed contamination, the whole source is an area of observed contamination:** A single sample from a source that shows observed contamination is all that is necessary to count the whole source as an area of observed contamination.

◆ **Consider mechanisms to transport hazardous substances to nearby properties:** In order to identify all areas of observed contamination, the mechanism that may transport hazardous substances to nearby properties should be carefully considered. These mechanisms include wind, surface water runoff and traffic.
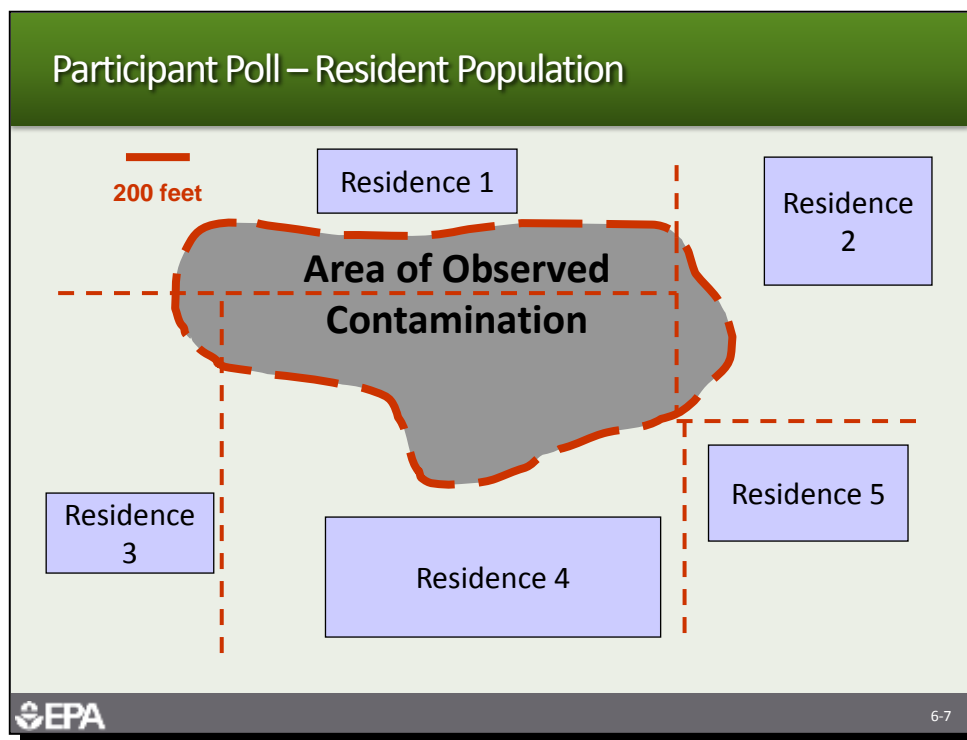
Resident Population Targets

- **Residents or students located on property with observed contamination and within 200 feet of an area of observed contamination**

- **Workers on property with observed contamination and within 200 feet of an area of observed contamination**

- **Terrestrial sensitive environments with observed contamination**

- **Resources**

♻EPA   6-6

Notes

◆ **Residents or students located on property with observed contamination and within 200 feet of an area of observed contamination:** Resident individuals include all persons that live, go to school or go to day care on property with observed contamination and within 200 feet of an area of observed contamination. Both conditions must be present.

◆ **Workers on property with observed contamination and within 200 feet of an area of observed contamination:** Persons that work on property with observed contamination and within 200 feet of an area of observed contamination are counted as targets.

◆ **Terrestrial sensitive environments with observed contamination:** Specific types of terrestrial sensitive environments located wholly or partially on property with observed contamination are targets for the resident population threat.

◆ **Resources:** Resources, including agriculture, livestock grazing and silviculture, that are on property with observed contamination are targets.

Notes

◆ **Example resident population:** The example above illustrates how resident individuals are determined.

> » All persons in Residence 1, 2 and 4 would be considered resident individuals because the homes are located on property with observed contamination and within 200 feet of an area of observed contamination.

> » The persons living in Residence 3 would not be included as targets because even though there is observed contamination on the property on which Residence 3 is located, the residence is not located within 200 feet of an area of observed contamination.

> » The persons living in Residence 5 would not be included as targets because even though Residence 5 is located within 200 feet of an area of observed contamination, there is no observed contamination on the property on which Residence 5 is located.

Nearby Population Targets

♦ **Residents that live and those that attend school within 1-mile radius of an area of observed contamination and who do not meet criteria for resident individual**

EPA   6-8

Notes

◆ **Nearby population targets:** Nearby population targets include residents that live and those that attend school within one mile of an area of observed contamination and who do not meet the criteria for a resident individual. These targets are distance weighted.
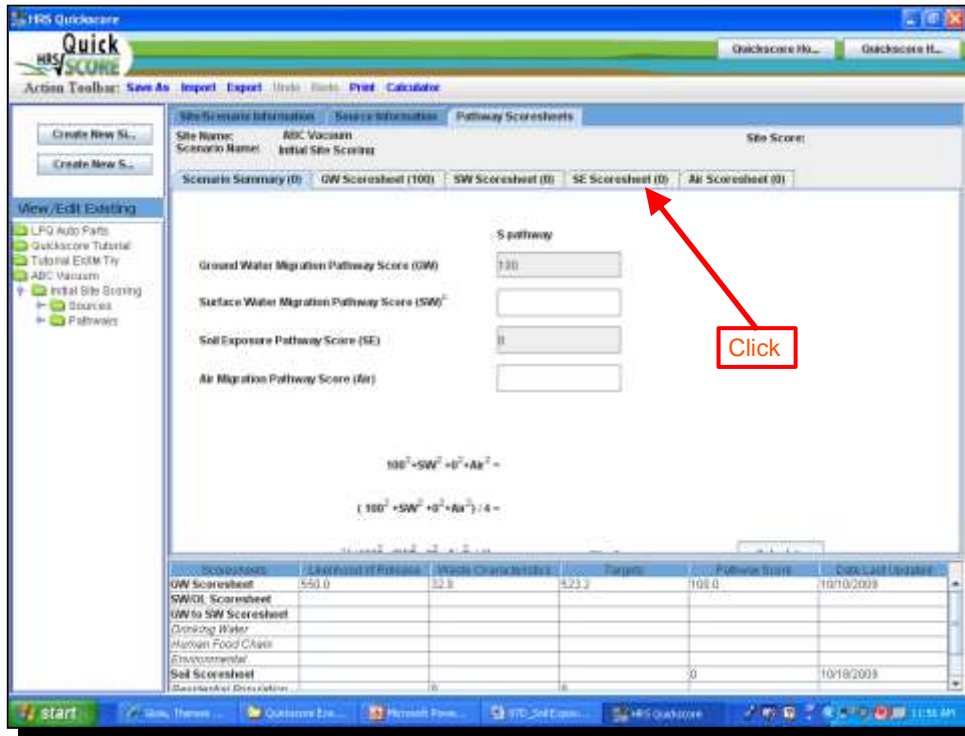
Instructor *Ask the participants to click on the Soil Exposure (SE) tab.*

ABC Site Soil Exposure Pathway Information

- ♦ **Nineteen residents live within 200 feet of the site**
- ♦ **No schools or daycare facilities are within 200 feet of the site**
- ♦ **The site is inactive; therefore, no workers are present on-site**
- ♦ **Ten people are employed at the crayfish ponds**
- ♦ **One report indicated that the warehouse complex employs 65 people**

EPA   6-10

Instructor *Review the site information with participants.*
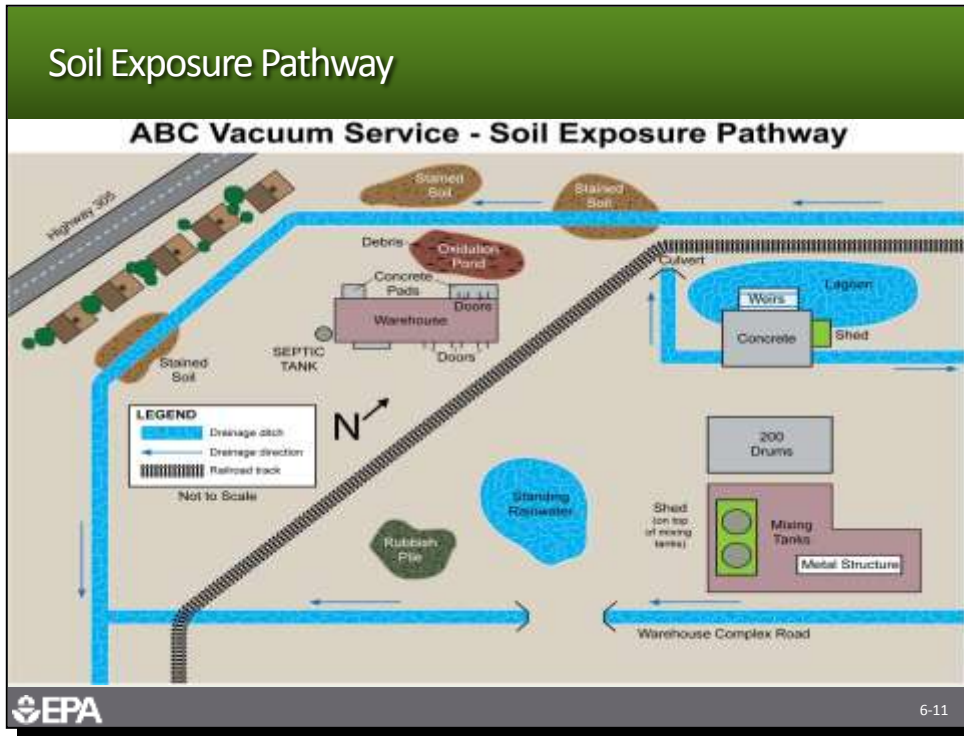
Instructor *Have the participants review the site diagram. Point out the residences.*

Instructor *Tell the participants this diagram depicts the 1 mile target distance limit.*

Using our BPJ, we assume that there is observed contamination. Select 550 from the drop down menu for likelihood of exposure

Instructor *Ask the participants to evaluate whether based on BPJ there is likely observed contamination at the ABC site. Tell them to be conservative. If they judge "yes" they should select 550.*

Click on the Area of Contamination (AOC) button to enter information about the AOCs
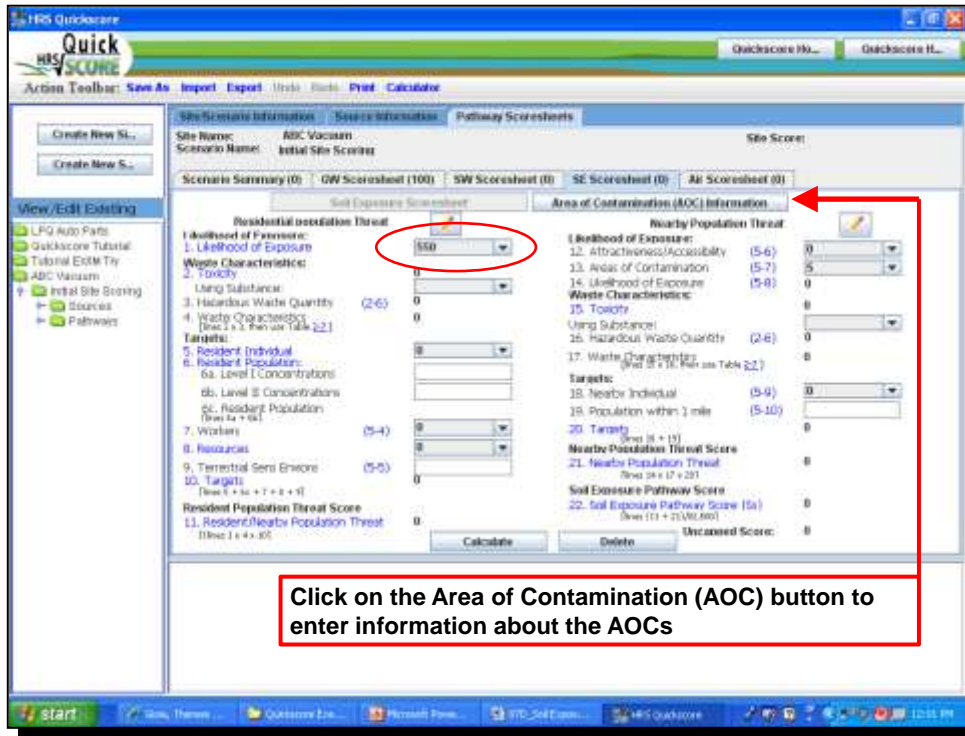
Instructor *Tell the participants that the conservative approach and site data should have caused them to select 550. Tell them to click on Area of Contamination (AOC) Information.*

Instructor *Tell the participants they will need to identify the sources as AOCs for the soil exposure pathway. They will need to input the volume or area, as appropriate and list the substances for each source.*

Instructor *Substances are added from the pick list. After highlighting the substance, click the blue arrow. Once all substances are in the box on the right, click "Add Substance(s)" button on the lower right of the screen. Close this window.*

Instructor *The volume for the drums should be 10,000 gallons. When you are done, double click on AOC B (tanks) in the table at the bottom of the screen.*

Instructor *The volume for the tanks should be 10 cubic yards. Add the substances by clicking on the SCDM button and adding each substance to the list. When you are done, double click on AOC C (lagoon).*

WC for Soil Exposure Pathway

♦ **Drums, tanks, other containers and surface impoundments with liquids can only be evaluated using Tier C – Volume**

♦ **How were the Lagoon and Oxidation Pond at ABC site previously evaluated?**

   » Tier D – Area

♦ **We need to estimate the volumes of the Lagoon and Oxidation Pond under Tier C for the soil exposure pathway**

♦ **See HRS Table-5-2 on the next slide.**

EPA   6-19

Instructor *Review the slide with the participants. Tell them that in order to count the Lagoon and Oxidation Pond, they will need to evaluate them under Tier C.*

TABLE 5-2
HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS
FOR SOIL EXPOSURE PATHWAY

Tier	Measure	Units	Equation for Assigning Value[a]
A	Hazardous Constituent Quantity (C)	lb	C
B[b]	Hazardous Wastestream Quantity (W)	lb	W/5,000
C[b]	Volume (V)		
	Surface Impoundment[c]	yd³	V/2.5
	Drums[d]	gallon	V/500
	Tanks and Containers Other Than Drums	yd³	V/2.5
D[b]	Area (A)		
	Landfill	ft²	A/34,000
	Surface Impoundment	ft²	A/13
	Surface Impoundment (Buried/backfilled)	ft²	A/13
	Land treatment	ft²	A/270
	Pile[e]	ft²	A/34
	Contaminated Soil	ft²	A/34,000

[a] Do not round to nearest integer.
[b] Convert volume to mass when necessary: 1 ton = 2,000 pounds = 1 cubic yard = 4 drums = 200 gallons.
[c] Use volume measure only for surface impoundments containing hazardous substances present as liquids. Use area measures in Tier D for dry surface impoundments and for buried/backfilled surface impoundments.
[d] If actual volume of drums is unavailable, assume 1 drum = 50 gallons.
[e] Use land surface area under pile, not surface area of pile.

♻EPA   6-20

Instructor   *Compare HRS Tables 2-5 and 5-2.*

Discuss the differences between the two tables, including:

Review the slide with the participants. Tell them that in order to count the Lagoon and Oxidation Pond, they will need to evaluate them under Tier C.

Volumes for Lagoon and Oxidation Pond

♦ **Lagoon**
   » 3,000 sq ft x 3 ft deep = 9,000 cu ft
   » 9,000 cu ft / 27 = 333.33 cu yd

♦ **Oxidation Pond**
   » 750 sq ft x 3 ft deep = 2,250 cu ft
   » 2,250 cu ft / 27 = 83.33 cu yds

♦ **Depths of the Lagoon and Oxidation pond were not provided in the file information; they were estimated based on BPJ**

⊕EPA   6-21
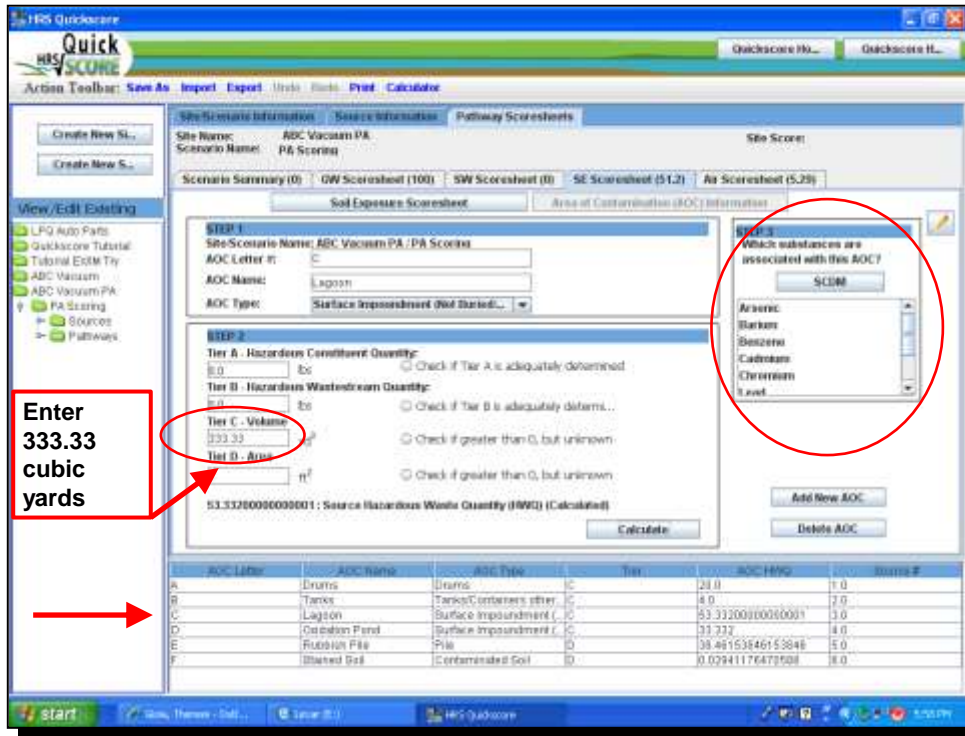
Instructor *Tell the participants that this slide shows the volume calculations for the Lagoon and Oxidation Pond. The depth of both surface impoundments is assumed to be an average of 3 feet. Tell them they will add the Lagoon and Oxidation Pond based on volume in the soil exposure pathway.*
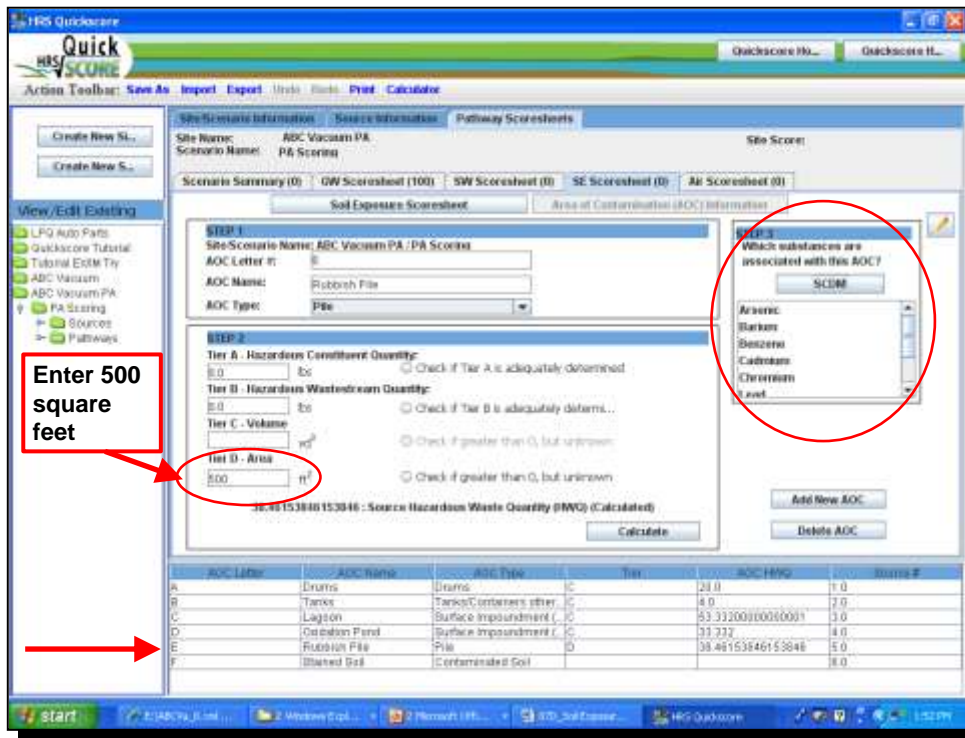
Instructor *The volume for the lagoon should be 333.33 cubic yards. Have the participants click on SCDM and add the hazardous substances and then return to this screen. Double click AOC D (oxidation pond).*

Source HWQ should equal 133.2 instead of what is captured on this screenshot.

Instructor *The volume for the oxidation pond should be 83.33 cubic yards. Have the participants click on SCDM and add the hazardous substances and then return to this screen. Double click AOC E (rubbish pile).*

Instructor *The area for the rubbish pile should be 500 square feet. Have the participants click on SCDM and add the hazardous substances and then return to this screen. Double click AOC F (stained soil).*
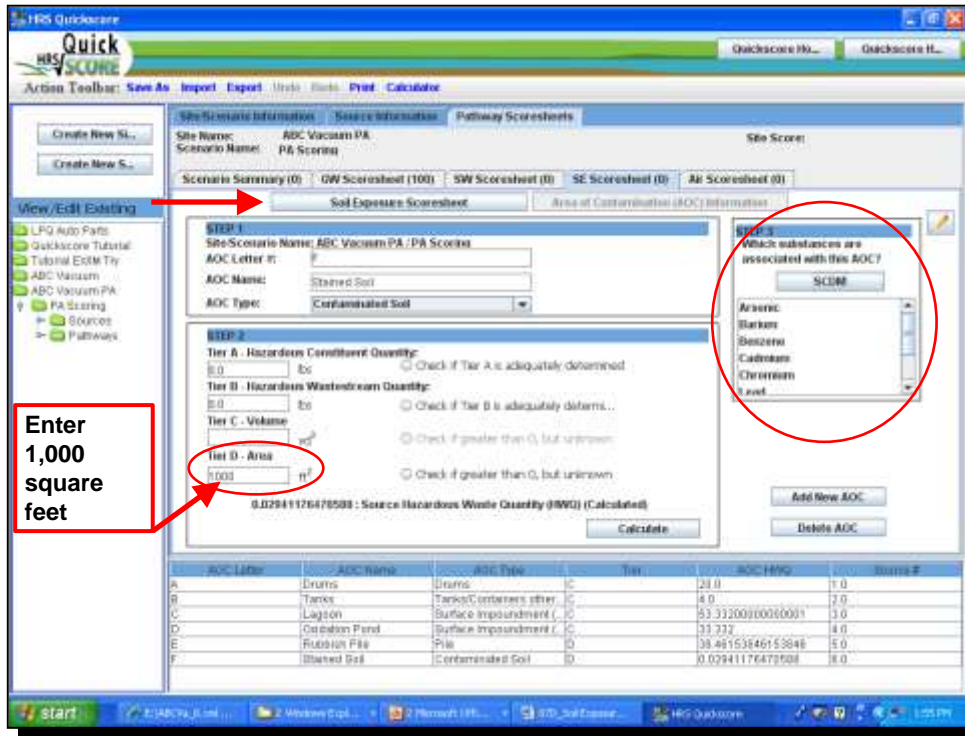
Instructor *The area for the stained soil should be 1,000 square feet. Have the participants click on SCDM and add the hazardous substances and then return to this screen. When all AOCs are done, have the participants click on the Soil Exposure Scoresheet button at the top left.*

Several hazardous substances that are associated with site sources have a toxicity of 10,000

Instructor *They should see a score in Waste Characteristics under both threats of 32. The program selected Arsenic, but many of the metals would have given the same score. Tell them they will now score Targets under the Residential population threat.*

Resident Individual

A person who lives or attends
school or day care on a property
with an area of observed
contamination **and** whose residence,
school, or day care center is
on or within 200 feet of an area of
observed contamination

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6-27

Instructor *Review the definition of Resident Individual with the participants.*

Scoring Resident Individual

- **Document resident individual exists**

- **Assign a value of 50 if at least one individual is subject to Level I concentrations**
  - » A hazardous substance is present above an HRS benchmark found in SCDM

- **Assign a value of 45 if no resident individual is subject to Level I concentrations, but at least one resident individual is subject to Level II concentrations**
  - » A hazardous substance is not present above an HRS benchmark found in SCDM

- **Assign a value of 0 if no resident individual is identified**

⊕EPA   6-28

Instructor *Review how the Resident Individual is scored, based on whether they are subject to Level I concentrations, Level II concentrations or not identified.*

Instructor *Tell the participants to review the ABC site information and determine how to score the resident individual.*

Instructor *Tell the participants that the example is being conservative and will assume Level I concentrations.*

Resident Population: Level I and II Concentrations

- **Determine the total number of resident individuals subject to Level I concentrations, either by an exact count or using average number of people per residence for that county**
  - » Multiply total by 10 and round
- **Determine the total number of resident individuals subject to Level II concentrations, but do not include Level I population, round to nearest integer**

EPA

6-31

Instructor *Review with participants how Level I and Level II concentrations are scored.*

ABC Site Resident Population

- **Several combinations or scenarios can be evaluated**
- **19 residents in 5 homes adjacent to site**
- **Level I**
  - » 19 x 10 = 190
- **Level II**
  - » 19 x 1 = 19
- **Other combinations using the 19 residents include:**
  - » Level I: 5 residents x 10 = 50
  - » Level II: 14 residents x 1 = 14

EPA   6-32

Instructor *Review the Level I and II calculations for ABC site. Remind them that other combinations are possible.*
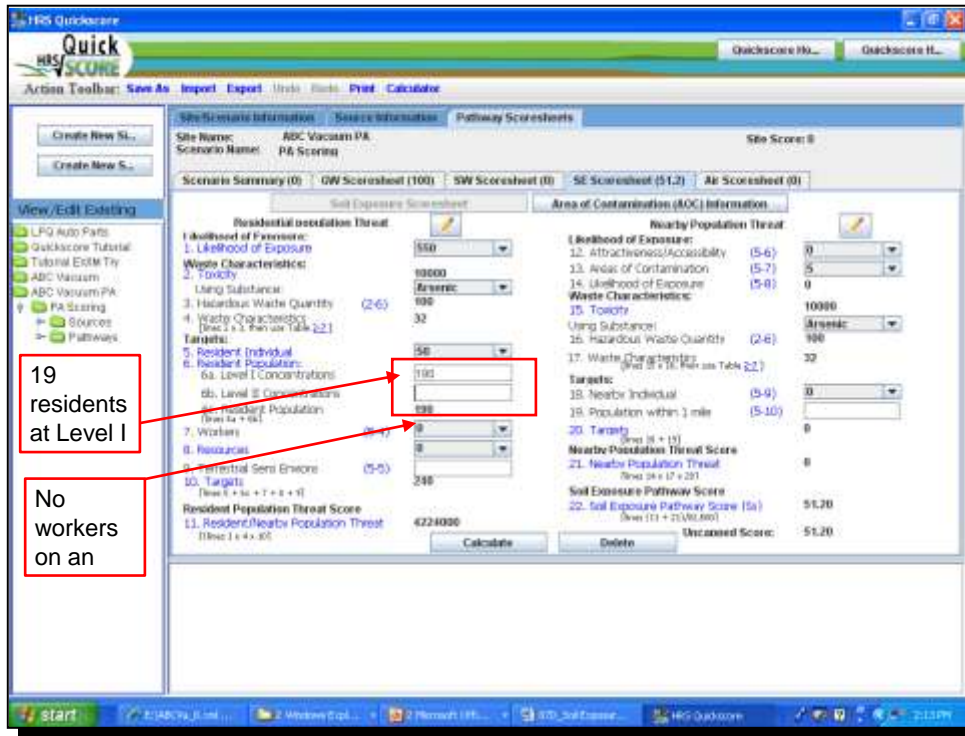
Instructor *Tell the participants that the example is assuming all 19 residents are subject to Level I contamination. Tell the participants that they will now evaluate the other three types of targets. The program does not calculate Level I and Level II populations. You must multiply Level I population by 10 and enter the product on line 6a.*

ABC Site Workers, Resources and Terrestrial Sensitive Environments

♦ **Are there any persons working on a property with an area of observed contamination and whose workplace is on or within 200 feet of an area of observed contamination?**

♦ **Are there resources within an area of observed contamination? See Section 5.1.3.4 of the HRS Rule**

♦ **Are there terrestrial sensitive environments at least partially on an area of observed contamination? See HRS Table 5-5**

EPA   6-34

Instructor *Review the questions with the participants and get a show of hands about their evaluations.*

Soil Exposure Pathway – Resources

5.1.3.4 Resources. Evaluate the resources factor as follows:

- Assign a value of 5 to the resources factor if one or more of the following is present on an area of observed contamination at the site:

  - Commercial agriculture.

  - Commercial silviculture.

  - Commercial livestock production or commercial livestock grazing.

- Assign a value of 0 if none of the above are present.

Enter the value assigned in Table 5-1.

6-35

Instructor *This slide shows the resources evaluated for the soil exposure pathway. Five points are assigned if resources are present.*

Instructor *Tell the participants that the example is assuming no other targets are involved. Tell the participants that they will now evaluation the Nearby Population Threat.*

```
------------------Table 5-6_Attractiveness/Accessibility Values ------------------
                                                          Assigned
Area of observed contamination                             value

Designated recreational area....................................... 100
Regularly used for public recreation (for example,
fishing, hiking, softball).................................................. 75
Accessible and unique recreational area (for example,
vacant lots in urban area)...............................................75
Moderately accessible (may have some access
improvements,for example, gravel road), with some
public recreation use....................................................50
Slightly accessible (for example, extremely rural
area with no road improvement), with some public
recreation use...............................................................25
Accessible, with no public recreation use................................... 10
Surrounded by maintained fence or combination
of maintained fence and natural barriers........................................5
Physically inaccessible to public, with no evidence
of public recreation use................................................0
--------------------------------------------------------------------------------------
```

Instructor *Tell the participants they need to find which description in Table 5-6 best fits the ABC site. Ask several participants how they would score the ABC site. Note that the site is accessible and that the ditches may be areas where neighborhood children would play.*

Instructor *Tell them the example is using 50. Tell them the program generated the area of contamination but that the next slide shows how the value is derived.*

Score Area of Contamination Using Table 5-7

```
--------Table 5-7_Area of Contamination Factor Values --------
Total area of the areas of observed                    Assigned
contamination (square feet)                             value
---------------------------------------------------------------------------------
Less than or equal to 5,000.................................................. 5
Greater than 5,000 to 125,000...................................... 20
Greater than 125,000 to 250,000.................................. 40
Greater than 250,000 to 375,000.................................. 60
Greater than 375,000 to 500,000.................................. 80
Greater than 500,000.................................................. 100
---------------------------------------------------------------------------------
```

Total area is 5,250: AOC 3 = 3,000 sq ft; AOC 4 = 750 sq ft; AOC 5 = 500 sq ft; AOC 6 = 1,000 sq ft

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6-39

Instructor *This table is used to obtain factor value for area of contamination. The total square feet of areas of observed contamination drive the value, the greater the area, the greater the factor value. However, the ranges of square feet from value to value are very large.*

Nearby Population Threat evaluates population within 1-mile travel distance from AOCs

Instructor   *Tell the participants that they will now evaluate targets.*

Nearest Individual

- **Assign a value of 0 if there is a resident individual**
- **If there is no resident individual, measure shortest overland distance from nearest residence, school, or day care and assign value using Table 5-9**
- **For ABC, assign 0 if you gave a value to resident individual and 1 if you did not**

⬥EPA   6-41

Instructor   *Review the slide with the participants.*

Assign 0 if Level I or II was scored ; If no Level I or II assign a value based on the travel distance

Instructor *This example uses zero because Resident Individual was scored which is more than zero. Tell the participants they will now evaluate the Population within 1 mile.*

Population Within 1 Mile

♦ **Includes persons who live or attend school within one mile of the site**

♦ **Three Distance Rings**
  » 0 to ¼ mile
  » ¼ mile to ½ mile
  » ½ mile to 1 mile

♦ **Distance weighting applied using HRS Table 5-10**
  » Distance weighted values from HRS Table 5-10 divided by 10
  » 1/10 x (sum of distance weighted values from distance rings)

EPA

6-43

Instructor *Review the slide with the participants on how Population within 1 Mile is calculated.*
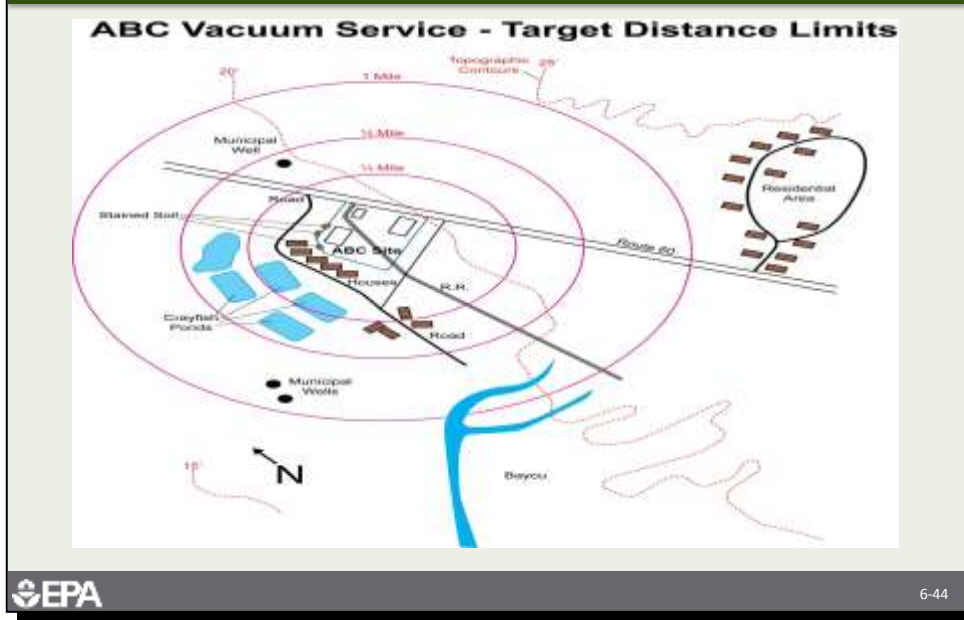
Instructor *Ask the participants to determine what residents, schools or day cares are located within 1 mile from the site.*

19 and 20. Population within 1 mile already evaluated for the resident population threat. Nearby population is 0.
11, 21, and 22. The score for each threat is calculated then summed to derive the soil exposure pathway score

Instructor *The ABC site has no population within 1 mile and is given a zero. Tell the participants to note the score for this pathway.*

Manipulate Scores

♦ **Assume only Level II targets for Resident Population Threat**

♦ **Assume Level I for one residence and Level II for four residences**

EPA   6-46

Instructor *Tell the participants to take a few minutes to manipulate the scores. Show the next two slides after the participants have done them on their computers.*

All residents in this scenario are evaluated as Resident Population at Level II Concentrations. The soil exposure pathway score drops significantly.

Instructor *This shows the score with no Level I and only Level II targets. The score goes from 51 to 14.*

This scenario evaluates 4 people at Level I and 15 at Level II. The soil exposure pathway score drops significantly.

Instructor *This shows the score with 4 Level I targets and 15 Level II targets. The score goes from 51 to 22.*

PA Scoring
Air Migration Pathway

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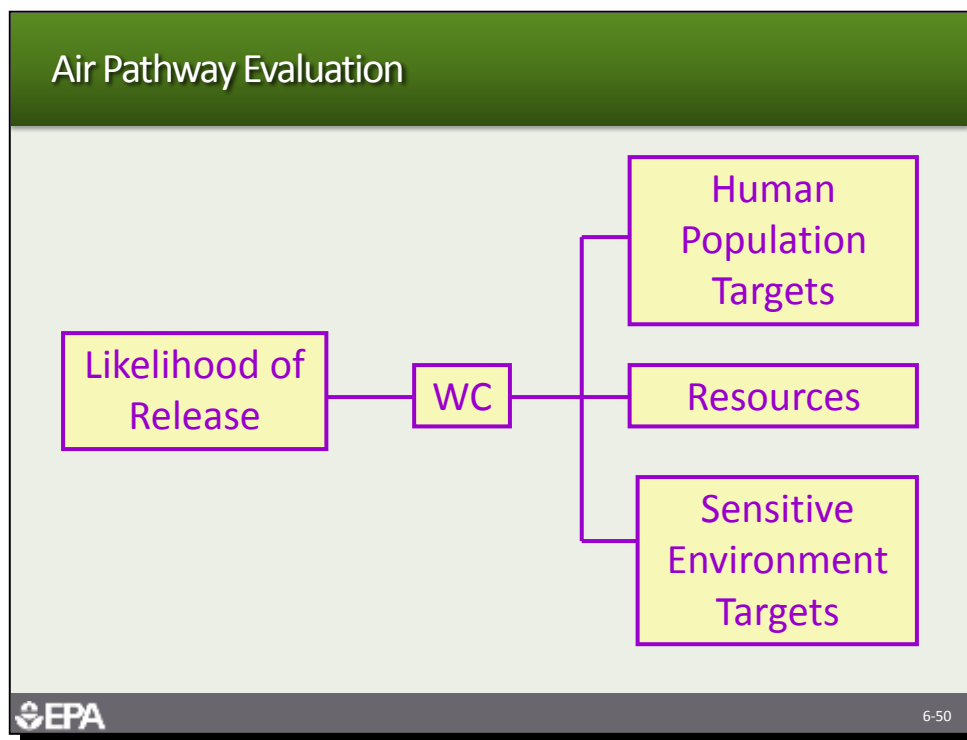
Air Pathway Evaluation

◆ **Air pathway evaluation:** The air pathway evaluates the likelihood of release of hazardous substances to air; the waste characteristics of toxicity, mobility and hazardous waste quantity; and the targets of human populations, resources and sensitive environments.

Site Assessment Questions

♦ **What is the likelihood that hazardous substances are being released to air and can be detected through air sampling?**

♦ **Who and what are likely to be affected?**

♦ **Air pathway is not used very frequently for HRS scoring**

❆EPA   6-51

Notes

◆ **What is the likelihood that hazardous substances are being released to air and can be detected through air sampling:** The site assessment should determine how likely it is that hazardous substances are being released to air from the site sources and should also evaluate if these hazardous substances could be detected through air sampling. Air sampling is complicated and costly and should only be undertaken if the likelihood is high that site-related hazardous substances will be detected at significant levels.

◆ **Who and what are likely to be affected:** The site assessment should identify all potential targets for the air pathway. These targets include residents, workers and those that attend school within 4 miles of the site sources, resources within ½ mile of the sources, and sensitive environments within 4 miles of the sources.

◆ **Air pathway is not used very frequently for HRS scoring:** The air pathway is rarely scored because of the complexities and cost of conducting the air sampling necessary to score the targets. The air pathway is usually only pursued if it is the only pathway available for scoring.

Notes

◆ **Evaluated differently than other PA migration pathways:** The PA scoring of the air pathway is based on the likelihood of detecting airborne contaminants during the SI. The PA should evaluate the efficacy of pursuing the air pathway during the SI.

◆ **Potential to release evaluates gaseous and particulate hazardous substances:** If an observed release is not scored, then potential to release is scored by evaluating both gaseous and particulate hazardous substances and using the substance which gives the highest score.

Air Targets

♦ **People living, going to school or working within 4 miles of sources**

♦ **Sensitive environments within 4 miles of sources**

♦ **Resources within ½ mile of sources**

❖EPA   6-53

Notes

◆ **People living, going to school or working within 4 miles of sources:** The human population targets for the air pathway include all those persons that reside, go to school or work within 4 miles of the site sources.

◆ **Sensitive environments within 4 miles of sources:** Sensitive environments within 4 miles of the site sources are also targets. Sensitive environments include wetlands and those on HRS Table 4-23.

◆ **Resources within ½ mile of sources:** Resources, including commercial agriculture, commercial silviculture, and major or designated recreational areas that are within ½ mile of site sources are also targets.
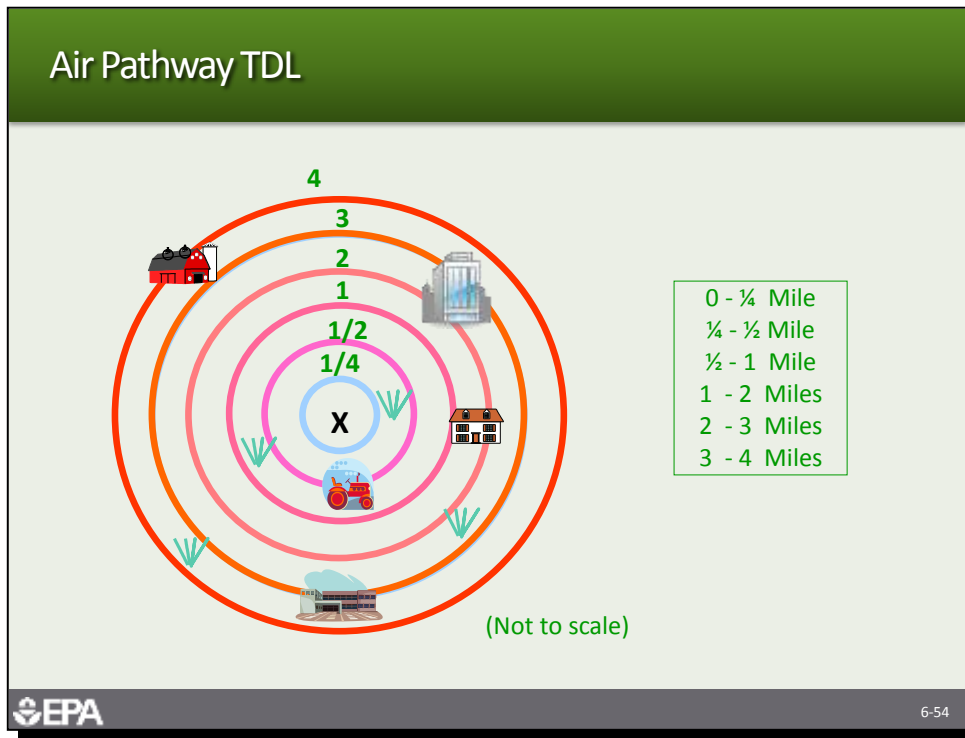
Notes

◆ **Air pathway TDL:** The air pathway TDL include the 0 – ¼ mile distance; ¼ mile to ½ mile distance; ½ mile to 1 mile distance; 1 – 2 mile distance; 2 – 3 mile distance; and 3 – 4 mile distance. Distance-weighting significantly lowers populations subject to potential contamination especially beyond the ½ mile distance.

Human Population Targets

♦ **Identify on-site population and in each of the six distance rings**

♦ **Use population databases or house counts**

♦ **Identify worker and student populations**

♦ **Use readily available information**

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Notes

◆ **Identify on-site population and in each of the six distance rings:** The PA should identify population on the site and in each of the six distance rings associated with the 4-mile TDL.

◆ **Use population databases or house counts:** Population can be estimated using databases such as IGEMS, or conduct individual house counts and combine with county information on average number of people per house.

◆ **Identify worker and student populations:** Focus on identifying worker and student populations within ½ mile of the site, unless there are large schools, universities or business complexes farther than ½ mile from the site.

◆ **Use readily available information:** The PA should rely on readily available information that can be obtained easily and quickly.

Nearest Individual

♦ **Defined as closest person to any source at the site**

♦ **Indicates magnitude of threat to those people most likely to be exposed**

♦ **Represented by nearest regularly occupied building**

♺EPA   6-56

Notes

◆ **Defined as closest person to any source at the site:** The nearest individual is the closest person to any source located at the site. If the nearest individual is subject to Level I concentrations, the value assigned is 50. If the nearest individual is subject to Level II concentrations, the value assigned is 45. Otherwise, values are assigned based on how far away the individual is from the source.

◆ **Indicates the magnitude of threat to those people most likely to be exposed:** The nearest individual factor is a reflection of the magnitude of threat to the people that are most likely to be exposed.

◆ **Represented by nearest regularly occupied building:** The nearest individual is represented by the nearest regularly occupied building, which can be a business, school or residence.

Population

♦ **Level I concentrations**
♦ **Level II concentrations**
♦ **Potential contamination**
  » Distance-weighted

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Notes

◆ **Level I concentrations:** Those persons subject to Level I concentrations should be identified or estimated based on BPJ. This number is then multiplied by 10 and this value is the Level I population.

◆ **Level II concentrations:** Those persons subject to Level II concentrations should be identified or estimated based on BPJ. This number is entered into QuickScore and should not include the people subject to Level I concentrations.

◆ **Potential contamination:** The PA should identify residents, workers and students within 4 miles of the site. The populations associated with each TDL are distance-weighted. The distance-weighted populations are added together and divided by 10.

Resources and Sensitive Environments

- **Resources evaluated on presence within ½ mile**
  - » Commercial agriculture
  - » Commercial silviculture
  - » Major or designated recreation area
- **Sensitive environments within 4-mile TDL of source evaluated based on actual and potential contamination**

⬧EPA   6-58

Notes

◆ **Resources evaluated on presence within ½ mile:** Resources include commercial agriculture, commercial silviculture, and major or designated recreation areas. The resources must be within ½ of sources at the site.

◆ **Sensitive environments within 4-mile TDL of source evaluated based on actual and potential contamination:** Sensitive environments within the 4-mile TDL are evaluated based on both actual and potential contamination. Potential contamination is subject to distance-weighting.

Air Pathway Score for ABC Site

♦ **We will not score the air pathway in the same way we scored the other pathways**

♦ **Walk through scoring for the air pathway**

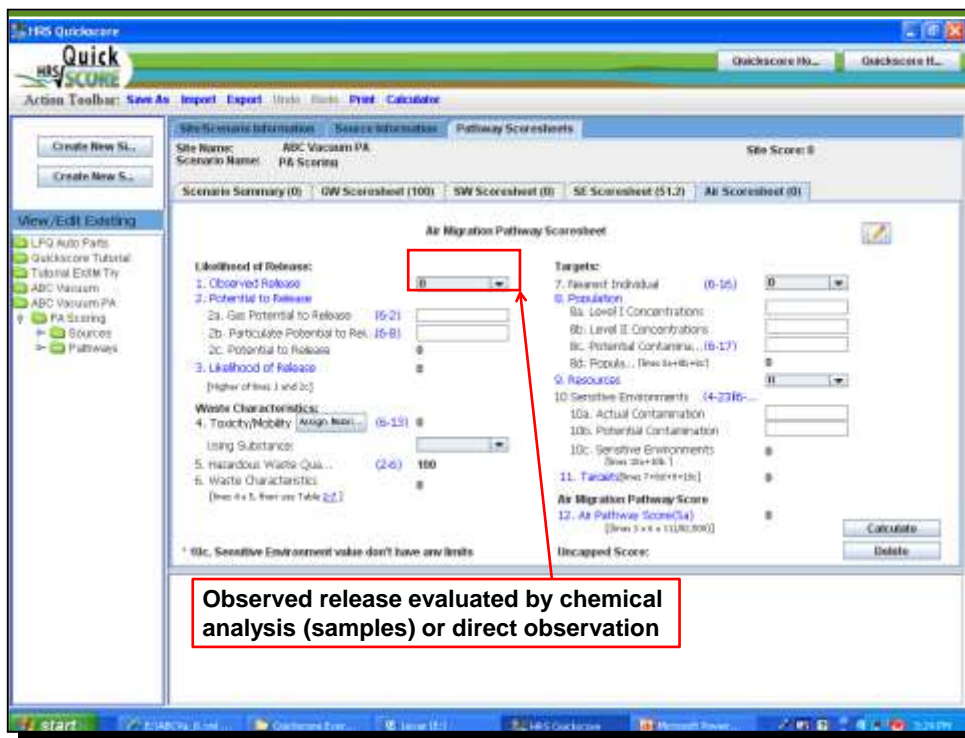♦ **Show how different scenarios affect the pathway score**

EPA

6-59

Instructor *Tell the participants that they will not score the air pathway using QuickScore because the pathway is rarely scored. Tell them that instead you will walk through how ABC was scored for the air pathway.*

Observed release evaluated by chemical analysis (samples) or direct observation

Instructor *Tell the participants that based on BPJ, the ABC site hazardous substances would not likely be detected in air samples, and therefore, it has been given a zero for observed release. Instead, the site was scored based on potential to release.*

Gas Potential to Release

Source	Source Type	Gas Containment Factor Value	Gas Source Type Factor Value	Gas Migration Potential Factor Value	Sum	Gas Potential LR Value (by source)
		A	B	C	(B + C)	A(B + C)
Lagoon/ Pond	Surface Impoundment	10	28	17	45	450
Ditches	Contaminated Soil	10	19	17	36	360
Rubbish Pile	Pile	10	6	6	12	120
Tanks/ Drums	Containers	0	22	6	28	0

$\bigcirc$EPA   6-61

Instructor *Tell the participants this is a work table from the HRS model. It is used to develop the gas potential to release value. For each source, you determine a gas containment value, gas source type value and gas migration potential value based on tables in the HRS model. The source type and migration potential values are then added together, and multiplied by the containment value. For ABC, the surface impoundments gave the highest gas source value.*

Particulate Potential to Release

Source	Source Type	Particulate Containment Factor Value	Particulate Source Type Factor Value	Particulate Migration Potential Factor Value	Sum	Particulate Potential LR Value (by Source)
		A	B	C	(B + C)	A(B + C)
Lagoon/ Pond	Surface Impoundment	0	0	6	6	0
Ditches	Contaminated Soil	10	22	6	28	280
Rubbish Pile	Pile	10	6	6	12	120
Tanks/ Drums	Containers	0	22	6	28	0

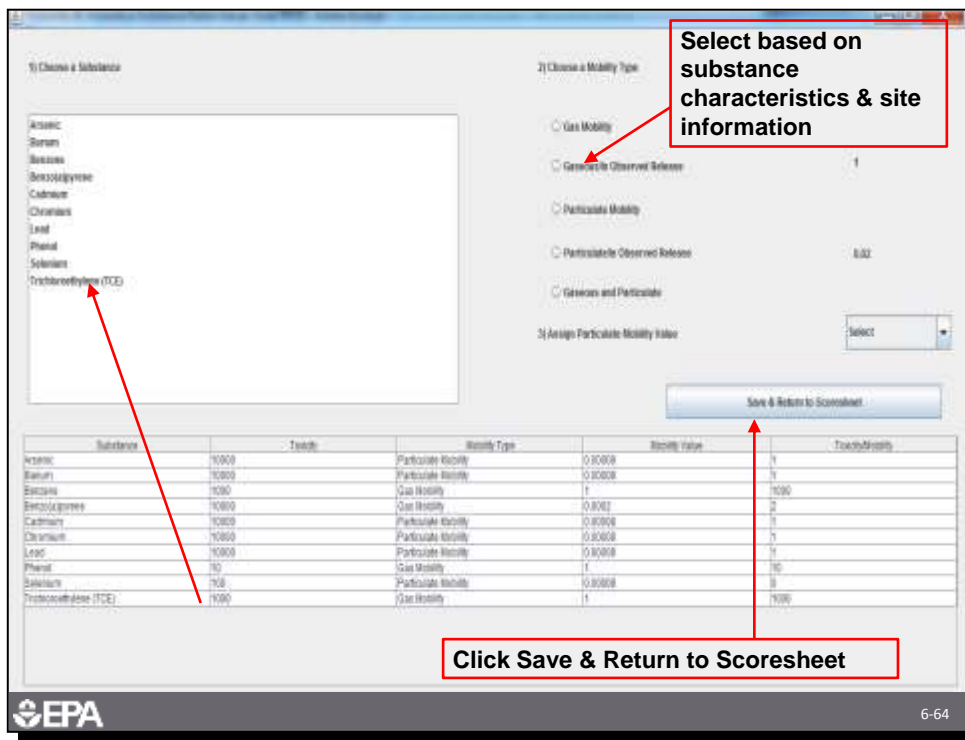*EPA*   6-62

Instructor *Tell the participants that the same evaluation is done for particulates. For ABC, the contaminated soil has the highest particulate source value.*
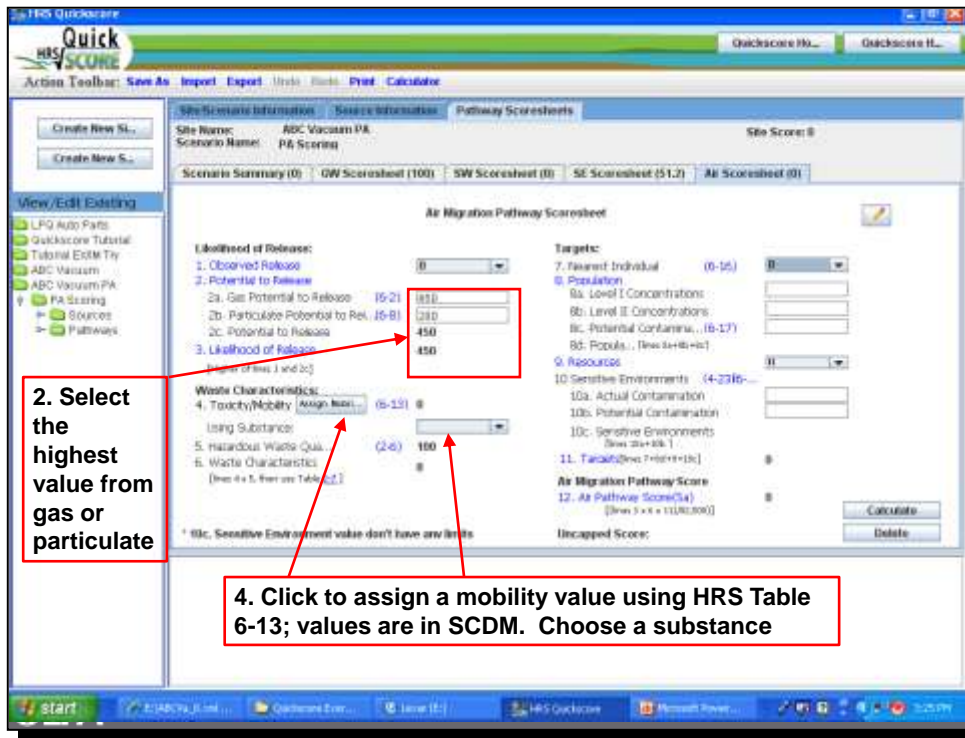
Instructor *Tell the participants that the program then picks the higher of the two values and uses that to score the pathway. Next we will look at how to assign mobility and toxicity.*

Instructor *This is the screen you see when you select Assign Mobility under Waste Characteristics. First you choose a substance, then you choose a mobility type. When you choose particulate mobility you also need to select a Particulate Mobility value from the drop down menu. These values are taken from an HRS map of the country, with various regions assigned values. Louisiana has a particulate mobility of 0.00008. The mobility for gas, gaseous in observed release, particulate in observed release, and gaseous and particulate is assigned by the program automatically. Once all substances are added, save and return to scoresheet.*

4. TCE yields the highest air T/M

5. HWQ previously determined from sources
6. Waste characteristics is the product of T/M and HWQ. Then value obtained from HRS Table 2-7

Instructor *TCE was the contaminant with the highest toxicity/mobility resulting in a WC of 18. Benzene also has the same toxicity/mobility as TCE.*

7. Assign 50 for Level I, 45 for Level II, or value from HRS Table 6-16 for resident closest to sources. Closest resident is within 200 feet; therefore, 20 points for within 1/8 mile.

Instructor *Tell the participants that the drop down shows the options for nearest individual. For ABC, no Level I or II concentrations are assumed and so the nearest individual is associated with the closest residence, which is in the 0 to 1/8 mile distance. This gives a value of 20. There are no Level I or Level II populations, so these are both 0. The rest of the population is subject to potential contamination.*

Nearest Individual: HRS Table 6 – 16

TABLE 6-16
NEAREST INDIVIDUAL FACTOR VALUES

Distance to Nearest Individual (miles)	Assigned Value
Level I concentrations[a]	50
Level II concentrations[a]	45
0 to 1/8	20
Greater than 1/8 to 1/4	7
Greater than 1/4 to 1/2	2
Greater than 1/2 to 1	1
Greater than 1	0

[a]Distance does not apply.

EPA

6-67

Instructor *The nearest individual factor values are found in HRS Table 6-16. The values are based on Level I and Level II concentrations for actual contamination, and distance-weighted values for potential contamination.*

| Distance	Population	Number of People Within the Distance Category							Factor Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	
On source	0	0	4	17	53	164	522	1633	0
> 0 to ¼ mile	35	0	1	4	13	41	131	408	13
> ¼ to ½ mile	0	0	0.2	0.9	3	9	28	88	0
> ½ to 1 mile	1096	0	0.06	0.3	0.9	3	8	26	26
> 1 to 2 miles	1254	0	0.02	0.09	0.3	0.8	3	8	8
> 2 to 3 miles	1733	0	0.009	0.04	0.1	0.4	1	4	4
> 3 to 4 miles	2406	0	0.005	0.02	0.07	0.2	0.7	2	2
								Total Factor Values	53

6-68

Instructor *This table is not in the HRS model, but it does summarize how the potential contamination population for ABC was determined. The first column shows the TDLs. The second column shows the ABC population for each distance category. The data for ½ mile to 4 miles came from GEMS. The data for 0 to ¼ mile is based on site knowledge. The distance weighting is shown in the middle. The distance-weighted population values are added for a total of 53. The sum is then divided by 10 and rounded.*
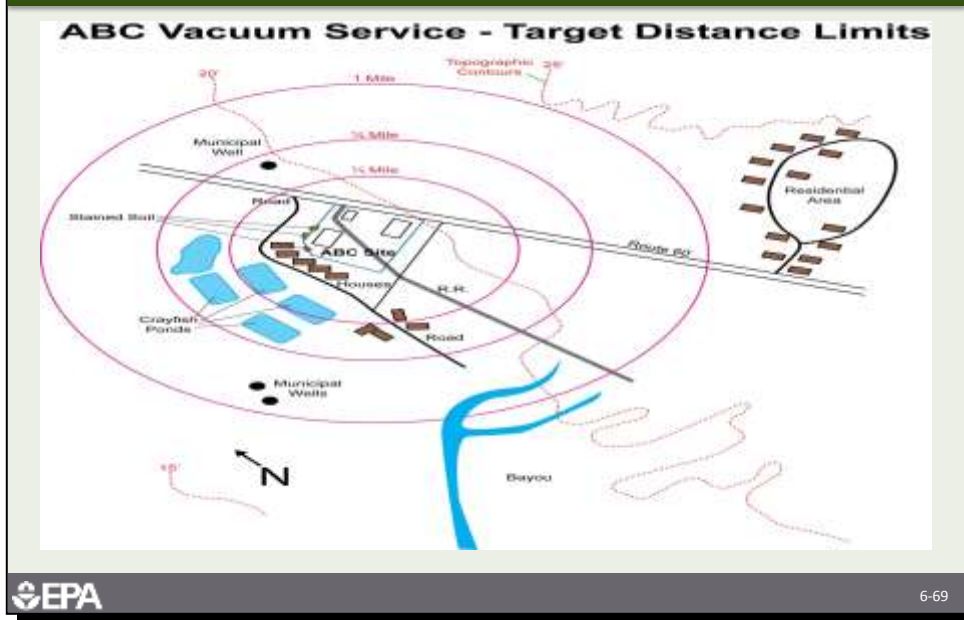
Instructor *The population in the 0 to ¼ mile distance includes the 5 residents, crayfish farm workers and one of the warehouses in the warehouse complex. It was estimated that the population was 35.*

8a and 8b. No Level I or II.
8c. Sum distance-weighted potential contamination values from each distance ring. Quickscore multiplies the sum by 0.1 to get the distance-weighted population contamination factor value. 8d. Total targets value

Instructor   *The score for potential contamination is 5. The program makes the calculation based on distance weighted population, so the distance weighted population should be entered on line 8c.*

9. Used BPJ and assumed resources. Assigned 5 from drop down menu. 10. No sensitive environments scored. 11. Total targets 12. Click for the air migration pathway score

Instructor *The resource score for ABC is 5 because of the crayfish farm. There are no sensitive environments within 4 miles of the site. Because of the low target number, the score for the air pathway is 1.96.*

All residents within the 0.25 mile distance ring are evaluated as Level II

This scenario evaluates 35 residents within 0.25 mile at Level II concentrations. The pathway score did not change significantly.

Instructor *Tell the participants that this summary shows the effect of assuming Level II contamination. In this case, Level II contamination only increases the pathway score by about 6 points to 8.25. This score is limited due to the low waste characteristics factor value (low toxicity/mobility) and low targets value for Level II contamination.*

All residents within the 0.25 mile distance ring are evaluated as Level I

This scenario evaluates 35 residents within 0.25 mile at Level I concentrations. The pathway score did not change significantly.

Instructor *Tell the participants that this summary shows the impact of assuming an observed release and Level I contamination. The nearest individual score would be 50. The Level I concentration value is 350 and the potential contamination is 4. The increase in targets results in a score of 39.67. The pathway scores are affected by a low WC value.*