Hello everyone and thanks for signing in to today's webinar. My name is Peter Chronowski, and I've been asked by the Pollution Prevention Section/Environmental Quality Assurance Division of the Bureau of Design to prepare and present this webinar session on Site Investigation and Project Management Environmental topics . Mr. Ken Thornton, cheif of the pollution prevention section is also joining me on this webinar. On behalf of the Pollution prevention section, it's our pleasure to present this session, which is one of several that the Pollution Prevention Section is providing this year. <KJT discuss other training sessions?>

I am also here with Michelene Malosh who is the overall training project manager for the pub 611 training courses <michelene explains that the handouts will be available after the session on the technical training calendar>

The webinar you are attending was developed to provide a general awareness of the key factors that should be considered during contaminant site investigation for PennDOT. Specifically we will focus on key elements on how these activities are scoped and performed and provide recommendations on managing the projects.

In addition, we will also focus on one specific aspect of site investigation where tanks are encountered in the project area and are required to be removed. The department is now requiring that DEP's systematic random sampling is implemented to pursue soil attainment following removal of underground storage tanks within the transportation project area. Please feel free to take notes as we move through our material today.

Before we begin, I wanted to mention a couple of points for the benefit of all participants. For your comfort and to minimize distractions during the presentation, please take a moment to silence your cell phone.

Some webinars are set up so that all attendees are automatically muted. This is by design to help minimize background noise and disturbances DURING the presentation. If your phone is not muted, please do it now

Despite the fact we have muted phones, we want to encourage you to ask questions. In addition to three established breaks where questions can be asked, the proctor at your location should know how to submit questions using the GoToWebinar Question and Answer pane. This can be done at any time, so, if you have a question, please jot it down and submit it to your proctor at any time in during the presentation.

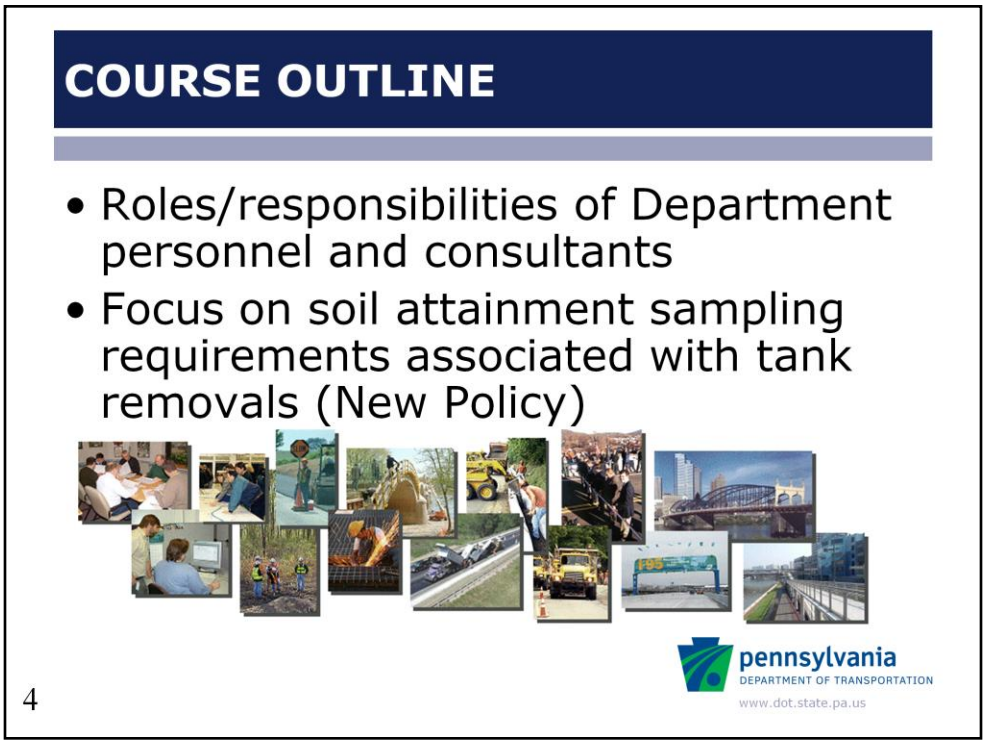
Bottom line - we are encouraging interaction among all the participants and will make every effort to address your questions during this session.

In addition, your training coordinator should have received sign in and evaluation sheets prior to this session. Please make sure that you fill these out before you leave to confirm that you have attended the training and to give us input on how this training was performed and how we can improve the training for future sessions.

Now that we've taken care of those few housekeeping items….I know your time is important, so let's get started.

We will be covering the site investigation procedures applicable to PennDOT's design, maintenance and construction projects. The topics we discuss are summarized on this slide and consist of:

1. The techniques and/or procedures that are used during each phase of Site Investigation (remember Pub 281 defines three specific phases)
2. "Typical projects" - where contaminant Site Investigation techniques are needed to define the liability to the Commonwealth and impact to the construction project



We will also be covering:

1. The responsibilities and roles of Department personnel and consultants
2. The sampling techniques and reporting that are required by PADEP for tank closures – one of the most typical issues that arise during a construction project

Throughout each section discussed today, we will provide ***recommended*** approaches to managing the risk and liability through the appropriate scoping, implementation, and completion.

KEY SITE INVESTIGATION PROCEDURES

- Environmental issues that warrant a site investigation
- Publication 281
  - Design
  - Maintenance
  - Construction

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For the next several minutes, we'll discuss some of the basic elements of a site investigation . We've selected a few examples of PennDOT projects, and some of you may recognize one or more of these examples.

I trust that most of you are familiar with the recommended contaminant investigation procedures presented in Pub 281. Please note, this is not Pub 281 training and therefore we are not going to get into the detail. In fact, we should mention that there will be separate Publication 281 training in the near future.

Rather, we are going to discuss several examples of environmental issues that warrant the investigation procedures that are established in Pub 281. And, we would be remiss if we did not reference and present the discussion consistent with this document as well as Pub 611 which is PennDOT"s Waste Management Guidance Manual.

In summary, Publication 281 provides standardized recommended procedures to evaluate potential impacts to a transportation project from wastes, and the procedures satisfy the requirements of NEPA and Pennsylvania's Act 120. Publication 281's procedures are applicable to PennDOT's design, construction and maintenance activities that involve the assessment, handling, generation, and/or remediation of wastes. Pub 611 provides an overview of the regulatory framework and basic management procedures for hazardous and non-hazardous waste streams typically generated by the Department. Where applicable, throughout this training we will refer to these two publications as they are both pertinent to the management and implementation of site investigation activities.

KEY SITE INVESTIGATION PROCEDURES

- Types of Site Investigations
  - Phase I
  - Phase II
  - Phase III
- Remedial Action

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This publication's procedures presents a logical, cost-effective methodology to assess contaminant impact and identify the impact to a transportation project. As more information is required, the level of detail and costs increases, and Publication 281 fully describes this process.

In summary, the process consists of:

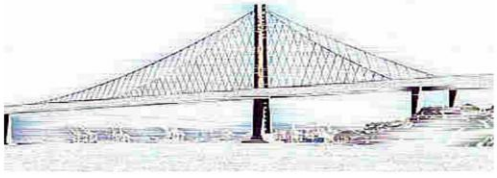
1. Identification of potential environmental concerns – the **Phase I**
2. Definition of the potential impacts through materials sampling/analyses that does not drilling activities – the **Phase II**.
3. Further definition or characterization of the extent of the environmental concerns to identify the need for additional investigation (potentially through several **Phase III** investigations)
4. Providing a description of the project deliverables such as final reports, closure documents and others, that satisfy DEP and might be used in design's PS&E packages
5. And finally, to satisfy PADEP-specific required procedures and documentation related to remedial action and attainment sampling associated with USTs closures

Just to clarify, the difference between a Phase II and a Phase III is the level of effort and cost. During a Phase II, for example, sampling for asbestos or groundwater from existing wells is OK, but sampling that requires the mobilization of expensive equipment, such as a drill rigs or direct push, is a Phase III.

This last topic, the attainment sampling is a remedial action and Central Office has identified that attainment deficiencies can be avoided saving both time and money. Therefore, we will spend some time on this effort.

Design/Construction

- Intersection Improvements/Widening
- Roadway Widening/Leveling
- Install/Replace Highway Access Connections
- Bridge Replacement



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Listed on this slide are typical transportation design/const. projects where environmental site investigations could be required.

Typically, potential waste issues are identified during the Engineering & Scoping activities, and one or more phases of investigation are implemented during preliminary design. This work is completed before the end of Final Design and incorporated in the construction specifications **or** addressed pre-construction.

The information obtained during this ESA will aid with establishing health and safety requirements during construction, materials handling, and will allow for evaluation of the potential environmental liability assumed by the Department.

Design/Construction

- Purpose is to define exposure
  - Identify environmental liability
  - Plan for waste handling
  - Avoid unnecessary liability or delays

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For example, lets say there are indications of the potential for historic underground storage tanks to exist within or adjacent to a planned road widening project that will require a strip take. This is one of the most common situations where the existing environmental conditions affect construction if utilities will be relocated, groundwater is shallow, and existing subsurface contaminated soil and/or groundwater must be handled during construction.

You should also note that these same procedures should be used in defining conditions that exist before construction on temporary easements. Again, the point here is to define environmental exposure BEFORE work begins.

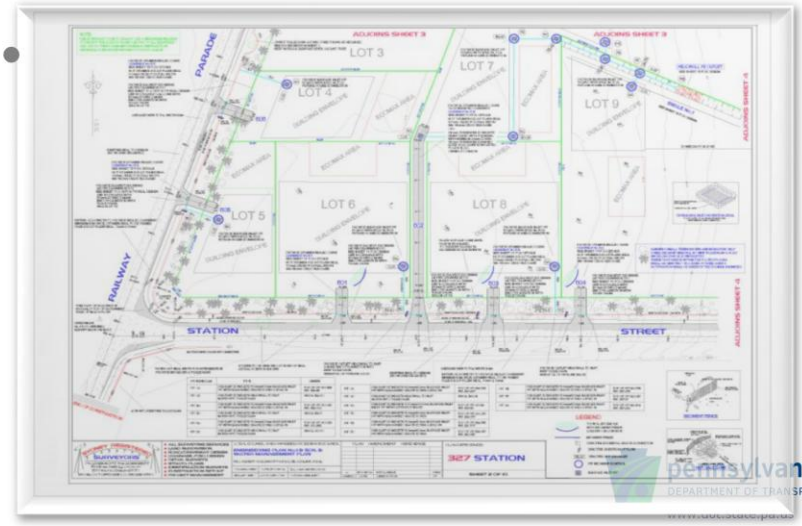
All that said, there are many occasions where “avoiding” an environmental concern is not be possible, and acquisition and subsequent cleanup of the contaminated property will be required.

NOTE: should we provide a figure showing a design revision scenario??

We will discuss this in further detail as we review the different phases of investigation in the subsequent slides of this presentation.

Listed on the next slide, if you can read it….

Design/Construction Example



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Is a normal land development project with new roads, access to existing roads, widening state roads, relocating underground and above-ground utilities.

What is not evident in these plans are historic land uses that can include include:

Former gasoline services stations

Location of former tanks at these two locations

Former manufacturing company with on-lot septic

These uses and potential environmental concerns are not evident during the engineering scoping, but they will become known during a Phase I.

Maintenance

- Stockpiles and Facilities
- Post-Construction
  - Bridges
  - Roadways/Shoulders

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The Department and its contractors have to take into consideration typical Site Investigation procedures associated with routine maintenance activities. For instance:

- Existing or former tanks at stockpile and maintenance facilities
  - Typically driven by PADEP regulations and Department policies and procedures
- Salt handling and storage

- Bridges
  - Assessment for presence of ACM and LBP prior to refurbishment/replacement
- Roadways/shoulders
  - Typical scenario for “hogging out the ditches” routinely for storm water management – need to perform due diligence for generated materials prior to performing maintenance activities.

Phase I Environmental Site Assessment

- Designed to satisfy "Appropriate Inquiry"
- Implemented by Preliminary Design

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The Phase I assessment consists of performing "**appropriate inquiry"** as defined by PennDOT Publication 281 which includes review of the historic and current land uses/practices that might have resulted in the release of a contaminant to soil or groundwater. This consists of a thorough site walk through , review of federal and state databases, past land ownership, and historic maps or aerial photographs - this phase does not include the collection and analyses sampling efforts, but does include a site reconnaissance.

You should note that the site reconnaissance is not just a 'windshield survey'. This should be a more thorough site walk after the review of historic property use to ascertain whether remnant features such as patches in asphalt or tank vent lines can be identified.

The deliverables of this study are reviewed by the District . However, if the report prepared by the investigator recommends a Phase III assessment, this report must be reviewed by the Pollution Prevention Section.

Phase I Environmental Site Assessment

- Implemented prior to other invasive efforts
- Not designed to eliminate alternatives
- Typical Cost??

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As pointed out in Pub 281, the Phase I should be implemented prior to other work study that requires access to the ROW and potential exposure to contaminants in the soil or other wastes – this specifically includes geotechnical sampling.

What are the typical costs to perform a Phase I ESA?

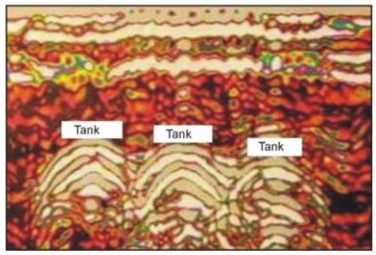
Generally, they will range from as low as $3k to >$20k depending on the size of the project which could be assessing a single property versus a 1+ mile construction corridor.

However, the Department and its consultant(s) should take into consideration the proposed design specs prior to developing the scope of work for the Phase I.

For instance, if the transportation project will only involve “surface” enhancements, then a detailed phase I may not be necessary; but if it is known that extensive subsurface work will be completed (utility relocation, leveling) or entire property takes are necessary, then a more extensive and detailed assessment will be necessary.

Phase II Environmental Site Assessment

- Based on Phase I Conclusions
- Uses Screening Technologies
- Initiated by Preliminary Design, complete by Final Design



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The Phase II assessment consists of limited sampling or other non-invasive assessment techniques that allow the investigator to refine his/her understanding of the concerns identified in the Phase I.

This phase of work should be initiated by Preliminary Design and completed by Final Design, or earlier if a Phase III is required.

By limited sampling, we mean the collection of data that is not costly and does not require significant efforts to complete. This includes geophysics, hand-tool collected soil or water sampling for contaminant screening analyses or field screening, asbestos surveys, and the like.

Asbestos surveys of facility building and bridges must be inspected for asbestos prior to demolition or major renovation in accordance with 40 CFR 61, Subpart M.

Phase II Environmental Site Assessment

- Limitations and constraints
- Deliverables
- Initiated by Preliminary Design, complete by Final Design

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There are limitations on soil or groundwater screening and these are discussed in Pub 281. For example, while a long ROW strip take can be screened for petroleum hydrocarbons, some of the recommended screening techniques have no regulatory basis for comparison to a PADEP standard. Thus, there is no guarantee that what is identified as clean soil or groundwater will be acceptable to a regulator.

Therefore, it is important to understand constraints of a Phase II, the needs of the Department, and whether a Phase II will satisfy those needs or whether a Phase II/III scope of work is more appropriate.

The deliverable for this phase should include the raw analytical data of samples and other screening techniques employed (i.e. geophysical data). Furthermore, as required in Pub 281, the findings must be evaluated relative to the impact on the transportation project. Also, please note that Pub 611 is an excellent reference for providing the Department personnel assistance with determination on what regulations govern the management of different waste categories; this will be helpful in conjunction with the investigation activities conducted to further assess the impact the identified waste will have on the transportation project.

We should also point out that: 1) Phases of investigation can be combined – such as a Phase I/II; and 2) qualified District personnel may conduct the Phase I, and 3) any Phase I or II report recommending a Phase III and the SOW for the Phase III MUST be reviewed by the PPS/EQAD BEFORE approval.

Phase II Environmental Site Assessment – Typical Costs

- Geophysical survey(s)
  - $750 - $3,500

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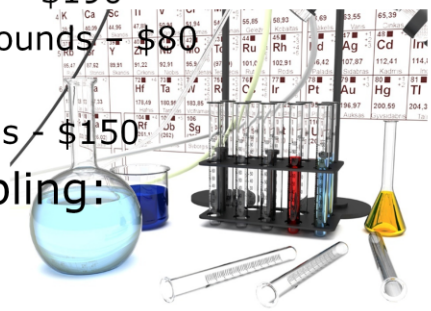
ON this slide, we are providing the average range in costs for tehcnical subcontractor and unit costs for (i.e. per sample collected) laboratory analytical suites based on typical phase II activities conducted for transportation projects.

Please note, as with Phase I environmental site assessments, the overall cost to implement a Phase II site assessment will be correlative to the size of the project (i.e. one property versus a 1-mile corridor with several properties potentially requiring environmental assessments)

However, it is important that the Department requires that the consultant(s) focus the Phase II activities (analytical suites) on the specific constituents of concern to ensure appropriate data is collected.

Phase II Environmental Site Assessment – Typical Costs

- Laboratory Analyses:
  - Leaded/unleaded gas & diesel - $150-$190
  - Used motor oil/lube oil - $190
  - Volatile Organic Compounds – $80
  - PCBs - $90
  - Priority Pollutant Metals – $150
- Groundwater Sampling:
  - $80 - $250



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Since the phase II field work only requires non-invasive investigation techniques, the cost for equipment, with the exception of geophysical equipment, should be minimal.

Typically, the most expensive equipment that will be used during this phase of investigation will be groundwater sampling equipment. This consists of pubs, water quality meter, depth-to-water probe, and potentially water treatment.

Therefore, we have also provided a range in cost for groundwater sampling equipment – but this is based on specific field conditions encountered at each project site – primarily depth to water and the need to treat the water before discharge.

Phase III Environmental Site Assessment

- Determine Nature and Extent within Study Area
  - Several phases
  - Specific analyses
- Overall Schedule

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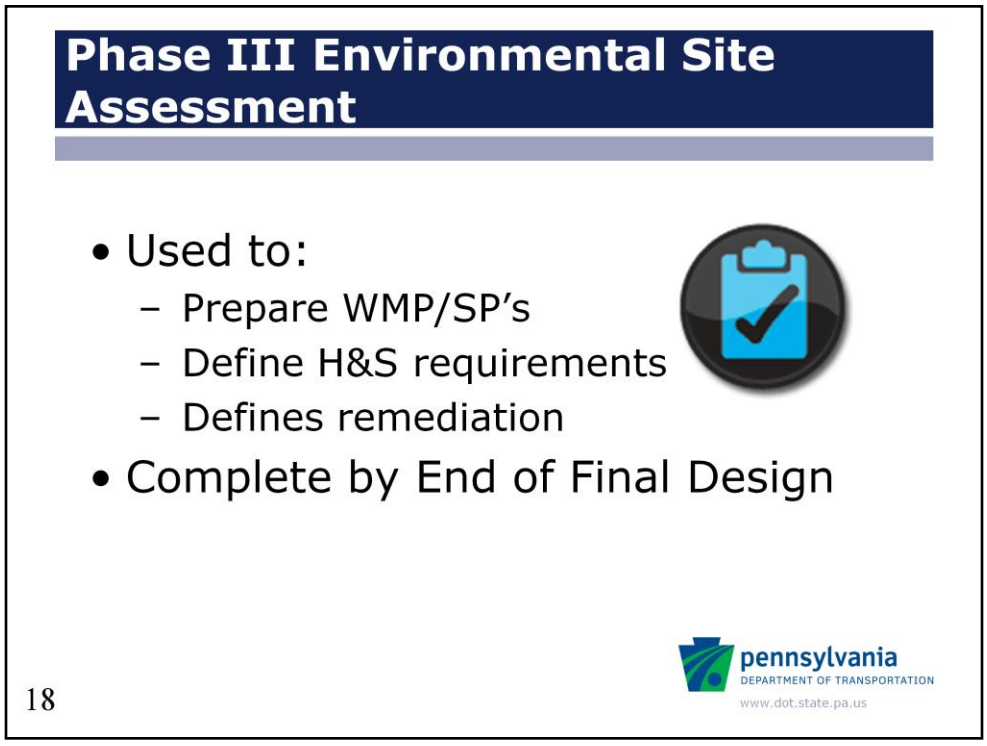
The objective of the Phase III uses the information gained in the Phase I and II, if implemented, to look for specific contaminants, in specific areas of the property, and if confirmed, to determine the extent of the impact within the project work area. At this stage, at a minimum, the investigator must consider data requirements and deliverables that will satisfy Pennsylvania's Act 2.

It is understood that to satisfy Act 2 and the Department's needs, the Phase III may consists of several phases of work that starts relatively broad and narrows in focus. But this should not suggest that a Phase III investigation extends beyond the needs of PennDOT – you do not necessarily have to identify the extent of impact or source if it lies outside the proposed right-of-way or land to be acquired by PennDOT.

Compound-specific analyses are identified at this point, versus "full target compound list analyses" programs, and the investigator should consider how remediation efforts can be incorporated into the designed project. For example, consider how contaminated soil could be used as fill within the project, or how the use of a deed restriction or engineering control could be effective as acceptable remediation solution versus excavation of impacted soil.

The Phase III work is best implemented later in the highway development process because this will allow investigator and PennDOT to consider how the proposed remediation, if required, can be integrated into the project with as little cost and time impact as possible. However, in certain cases it may be more appropriate to implement these activities earlier in the process to assess H&S concerns.



Since this phase of work is more extensive, the District and investigator must communicate the findings and schedule with the balance of the design team to keep the project on schedule. Also, remediation and health and safety requirements might be required within the PS&E package.

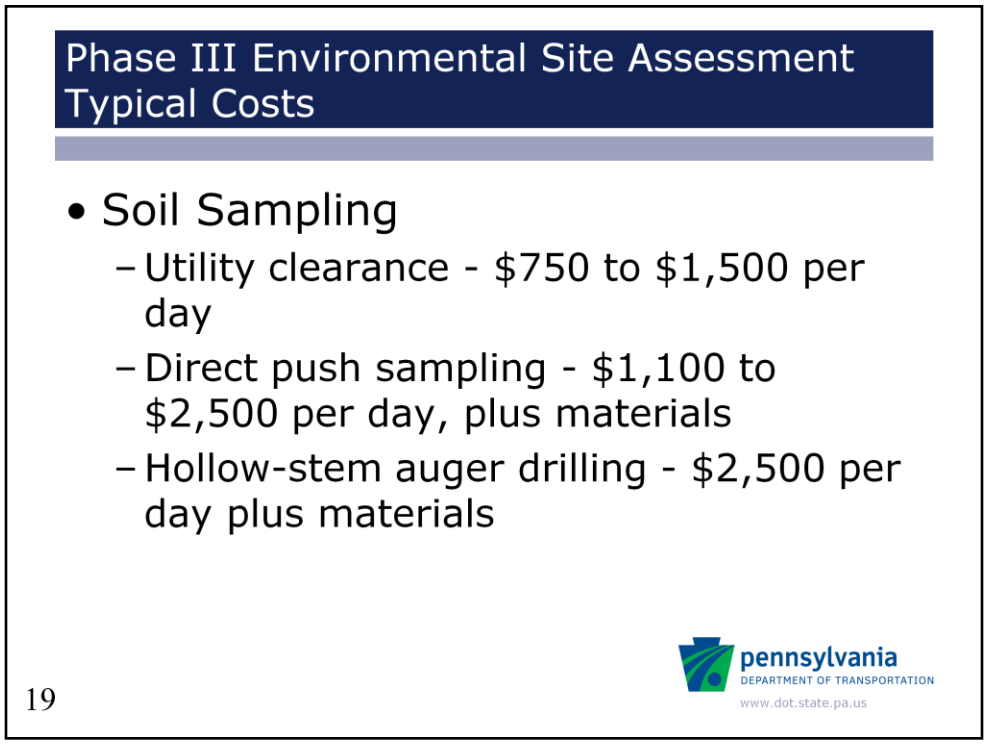
Phase III scopes of work and deliverables are more extensive. Unlike the Phase I or II, the Phase III report will likely be submitted to PADEP and reviewed by several parties.

When determining the remediation options, it is also important to consider the future use of the acquired excess property following completion of the transportation project. In the least, this may affect PennDOT's approach to implementing, or not implementing remedial actions or the extent to which the remedial action must extend.

For example, if groundwater is impacted with petroleum hydrocarbons and the Department is required to dewater or relocate utilities that reside below a shallow water table, the remediation may consist only of the water generated by the construction – you will not be responsible to remediate the extent of impacted groundwater from an up-gradient – outside the ROW source. Likewise, if the construction project does not intercept groundwater, PennDOT will not be responsible for cleanup.

We want to emphasize at the this time an important element – to maintain the objectives of the investigation. This Phase III program is meant to define the impact to the proposed construction and identify environmental liability that might be assumed by PennDOT in land acquisition. PennDOT is NOT the environmental police – you do not have to point fingers or prove a responsible party. However, there are times, particularly on entire parcel takes or on Commonwealth-owned property, where the Department will be required to remediate and comply with Act 2's technical and administrative requirements.

NOTE: maybe provide 1-2 examples here for consideration relative to tanks??



On this slide and the next slide, we provide the approximate average subcontractor unit cost ranges to conduct typical investigation activities for a Phase III Environmental site assessment.

But please understand that each project is unique in that the depth of the investigation will vary, the contaminants of concern will vary, and the equipment necessary to collect the samples will vary in the transportation project.

What does this mean?? You don't want to mobilize an air rotary drilling rig to collect samples from 10 feet below the ground surface in 10 locations within a right of way.

You also want to consider the other aspects of the project that can be combined with the Phase II sampling. For instance, it geotechnical borings are required to develop the design specifications, then you also must consider that equipment, but combine the efforts to mobilize only once.

Phase III Environmental Site Assessment Typical Costs

- Monitoring well installation
  - Overburden - $65 to $100 per foot
  - Air Rotary - $40 to $120 per foot
- Laboratory Analyses
  - Specific Compound Cost

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For groundwater monitoring well installation, you need to determine the media in which the wells will be installed prior to selecting the type of rig – this type of information should be determined during the Phase I/II assessment.

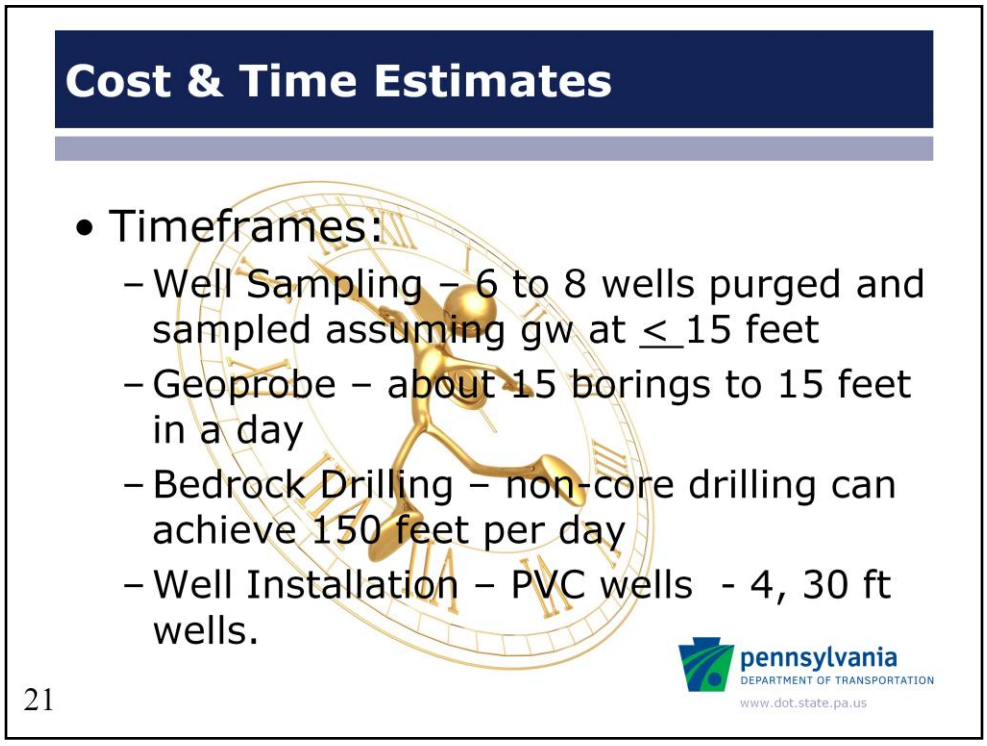
The cost per foot for monitoring well installation will vary considerable depending on the type of drill rig used and the number/depth of the wells to be installed. You must also consider the room at the work site. This includes lay-down area for equipment, overhead utilities, and space for a tender truck required by air rotary drilling. Or specialized drill rigs are required for hillsides, small access areas, or wet conditions.

Lastly, for laboratory analyses, these costs are similar to that presented in the Phase II estimate slide. However, we would like to reiterate that you should make sure the proposed analytical suite is focused on the constituents of concern based on the prior investigation findings. For instance, you don't want to run a full Target Compound List/Target Analyte List analytical suite for samples collected from a site that has only had a leaded gasoline release from a UST.

<<<switch to example cost estimate>>>>

For reference, you should now see up on your screen a cost estimate to perform a Phase III investigation for a typical phase III project; this will also be included along with this presentation on the technical training calendar. I know that we have primarily focused our typical costs for subcontractors and have not touched on consultant labor and expenses, so these spreadsheets should help understanding the possible cost of implementing a single effort of the Phase III Environmental site assessment.

For purposes of this example, we have assumed that both soil and groundwater sampling is required, and the contaminant of concern is gasoline and diesel from USTs that are no longer present. The site is accessible by a truck-mounted drilling rig, and no utilities are present. Finally, the soil sampling can be completed in one day using direct-push techniques and the Phase I/II indicates that groundwater is present in bedrock at a depth of approximately 115 feet.



So how much production can you expect:

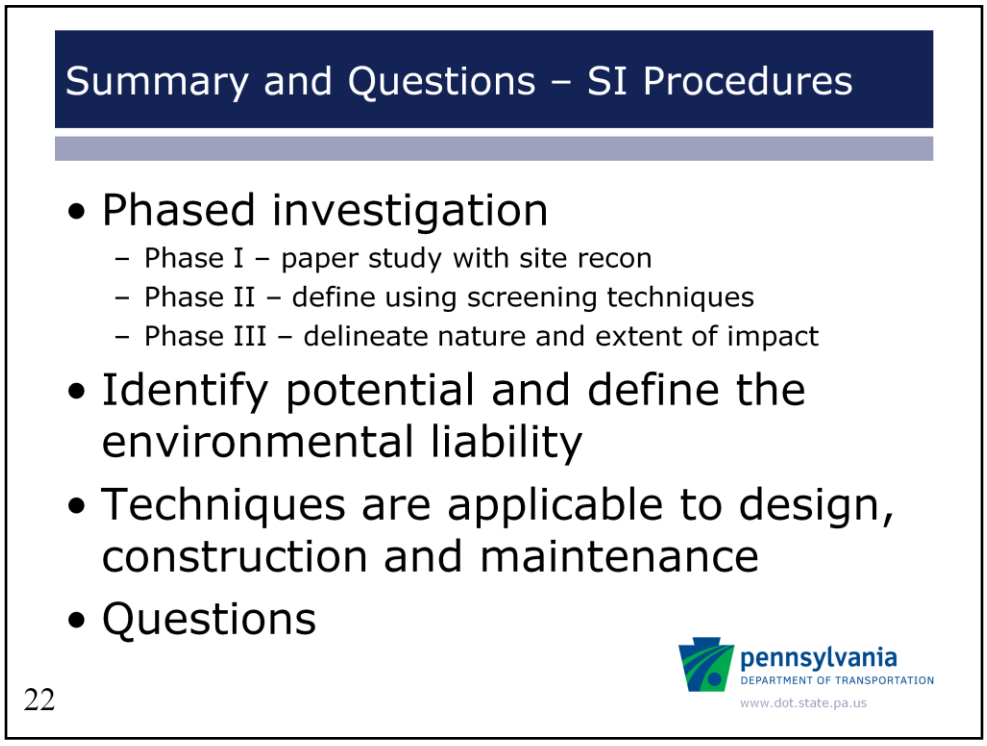
For well sampling, an experienced field crew can complete a six to eight well sampling event in 10 hours if groundwater is less than 15 feet below the surface and using low-flow sampling techniques. Purge water containing or treatment can increase the per-well time depending on distance between wells, equipment, and weather.

For hollow stem auger drilling work, an experienced driller, with easy access should be able to drill between 5 and 7 borings to 25 feet in a 10 hour day with continuous sampling.

For direct-push, reasonable production rates of between 200 and 225 feet can be expected including decontamination, moving between locations, and continuous sampling. Thus, 13 to 15 borings to 15 feet can be achieved in a day.

Bedrock drilling can vary with the type of equipment, such as air or mud rotary drilling, the type of bedrock, and depending on the experience of the driller. In one hole, drilling of 150 feet in a day is not uncommon.

As noted on the slide, well installation can vary as well, but 4 PVC wells of 30 feet can be finished in a day, while setting steel casing requires the casing to set during drilling the following day.



We have briefly discussed the Department's environmental due diligence efforts and purpose, and provided examples of the phases of work. It starts with a review of the historic property use to identify the potential for contaminants to affect the transportation project, and if it exists, moves to more complex and costly investigation to define the environmental liability and methods to mitigate this concern. Also, the information is used to support worker safety.

These techniques and the methodology are applicable to the Department's design, construction, and maintenance projects.

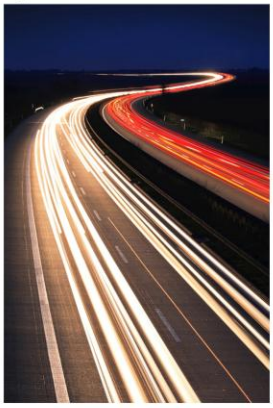
Whether the unknown tank or drum is discovered during a construction project, or whether roadside maintenance activities identify that a fuel truck released product along a drainage ditch two months ago, or stormwater or other utility relocation will occur proximal to a known leading underground storage tank site and shallow groundwater will require dewatering – some investigation efforts will be required, and in some cases, PADEP will eventually become involved.

So, before we move on to Part 2, are there any questions on the materials we've covered so far? I remind you, that you should use the question pane in the upper right corner.

<<QUESTIONS>>

Course Outline – Part II

- Applicability to roadway design, construction, and maintenance projects



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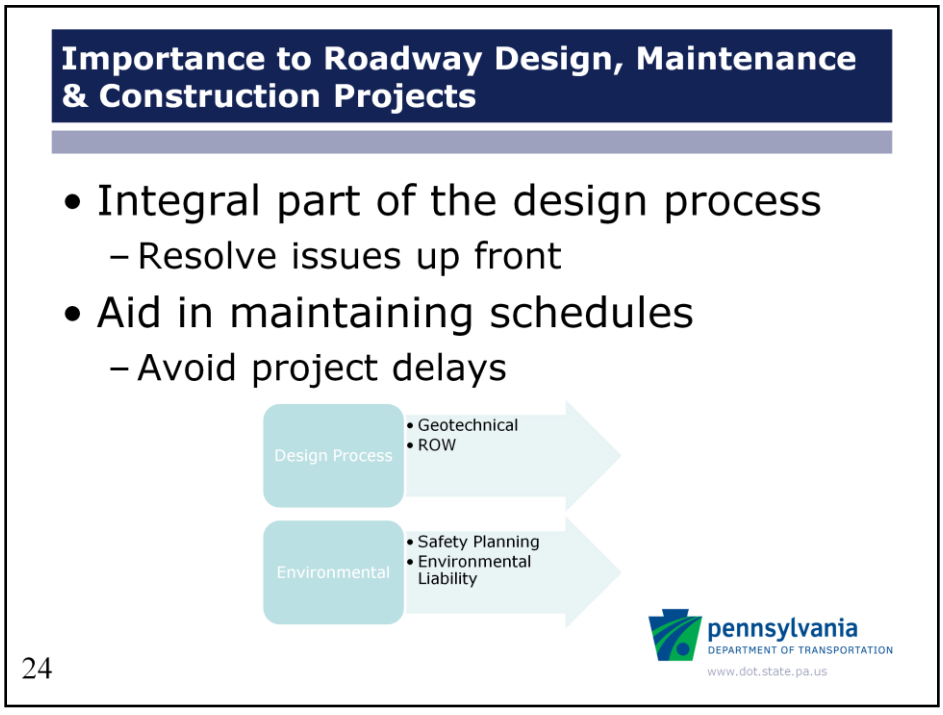
OK – so let's move on to the second topic – how these techniques are applicable to highway projects



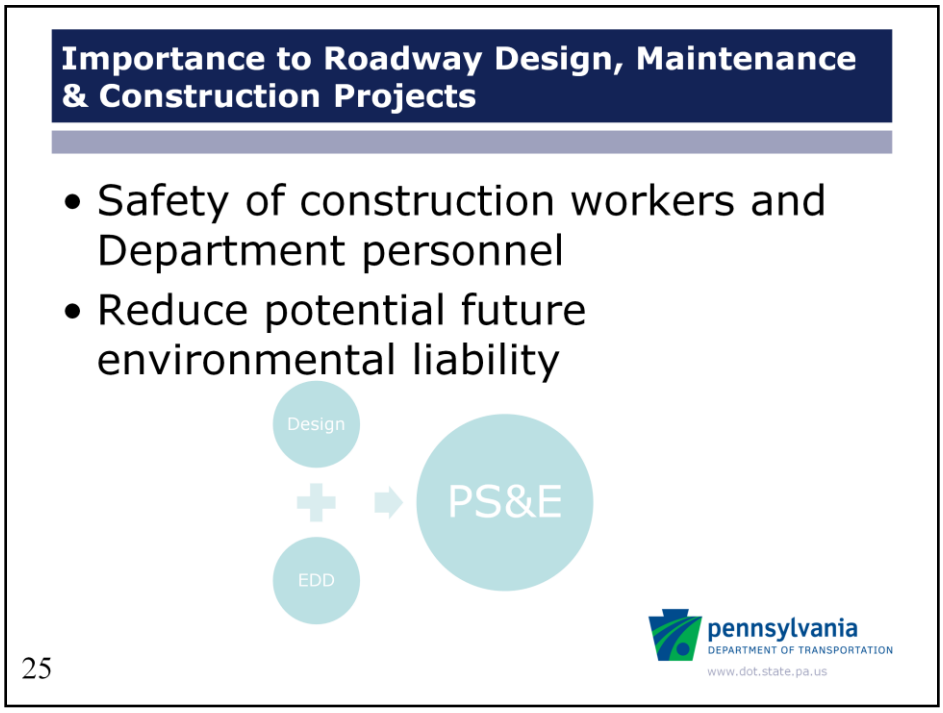
Now that we've gone over the types of site investigation activities that can be implemented as part of a typical design, maintenance or construction project, let's understand the importance of properly scoping, implementing and understanding/applying the results of these activities.

In collaboration with the Pollution prevention section , we have developed the list on this and the next slide as a reminder that the proper identification and planning for environmental concerns does avoid problems. Generally speaking, once it goes to construction there should be no significant surprises IF a proper SI was performed.

Therefore, to avoid waste management problems:

The site investigation should be considered an integral part of the design process b/c environmental issues may be identified that can be feasibly avoided or properly prepared for during design and/or construction spec development.

When a site investigation is performed and managed appropriately (following Dept guidance), the chance for encountering unforeseen circumstances during construction, and thus project delays can likely be avoided. Granted, not all potential issues can be identified ahead of time, but you will potentially be more prepared for an issue with proper site investigation implementation and evaluation.



A factor that is sometimes overlooked when preparing for a construction project is health and safety for the workers. Data obtained during site investigation activities should be sufficient to determine potential health and safety concerns and ensure proper information is provided to contractors for scoping of special needs/handling.

Lastly, PennDOT does not want to take on more environmental liability than necessary to complete the project.

The following slides summarize the responsibilities of Dept. personnel for site investigation projects and also what is establishes what Department personnel should expect of your consultants.

In general, the project manager for a site investigation project will likely be located in the District office. This person will be responsible for ensuring the project is appropriately scoped out, an experienced consultant is selected, oversees reviews and accepts work products, and communicates the SI findings with the balance of the Department's design team. This could also include PennDOT's right of way staff, construction management, and legal counsel.

ROLES AND RESPONSIBILITIES

- Environmental Consultants

- Understand	- Implement
- Propose	- Report

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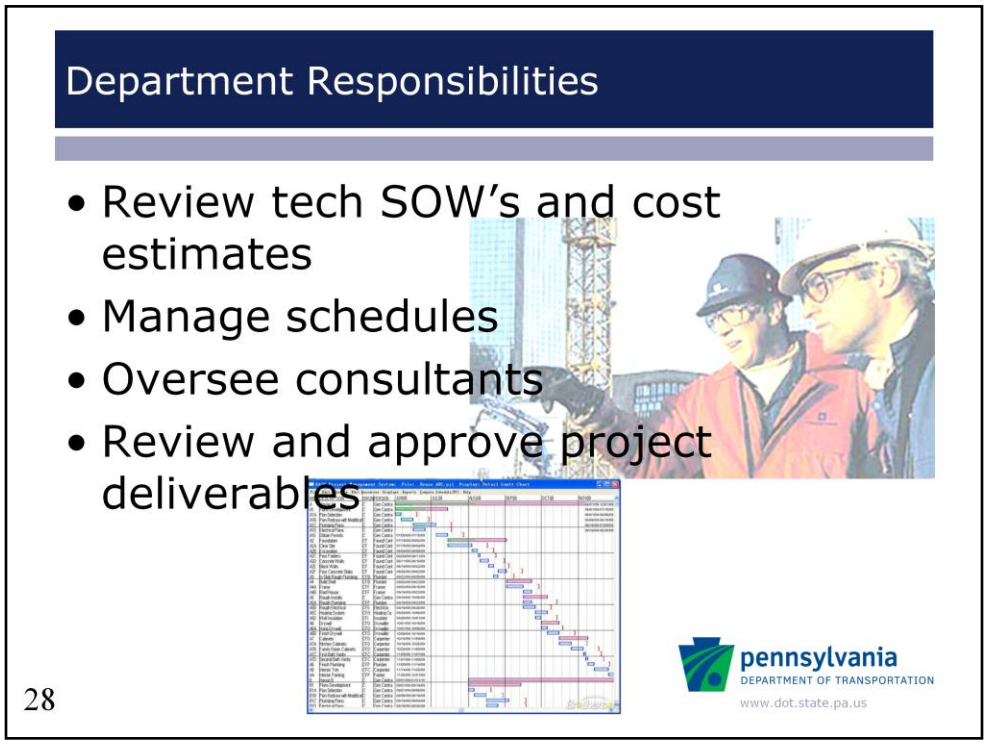
The environmental consultant, which may or may not be a part of the design team, has their own responsibilities. Specifically, the environmental consultant is responsible for developing a complete understanding of the transportation project and proposing the necessary site investigation approach that is appropriate for the project.

“Appropriate” is a vague term, but essentially the intent is to focus on specific concerns that could affect the construction project or represent an environmental liability for the Commonwealth.

The guidance provided in Pub 281 is excellent and the consultant is responsible to know this process and applicability to the issues. In addition, the consultant should have a strong knowledge of Pennsylvania’s Act 2.

So lets discuss some of these details…



First lets discuss the Department's responsibilities…

Number 1, it's the Dept's responsibility to make sure SI's are scoped and implemented correctly. Therefore, the Dept. will review **and** approve the tech SOW and cost estimate for SI activities. Some items to look for include:

•A detailed project timeline and how it fits the design and letting schedule.

•Ensure that interim and major task findings are communicated and schedule variations are reviewed. Understand – geology and contaminant investigations are NOT an exact science; we do our best to predict using information available, but in some cases data findings warrant SOW modifications and potential change orders.

•Lastly, and not in a particular order of importance, is reviewing and approving project deliverables. We can not stress enough the importance of requiring complete, concise, and appropriate deliverables on a SI project, especially when additional work is required.

Again, I want to remind you, that any Phase I or II that recommends a Phase III is required to be reviewed by pollution prevention personnel. This is pertinent because you want to ensure the you want to make sure the proposed scope of work complies with the appropriate environmental guidance and regulations which all of the PPS staff are familiar with.

Environmental Consultant Responsibilities

- Understand the Project
- Prepare Tech SOW's
- Follow DOT/DEP Guidance

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From your perspective, what are the responsibilities of the Consultant?

We want to reiterate the importance of understanding the project; be it a bridge replacement, roadway expansion, intersection improvement, or other…. The consultant should understand the Dept's "end product" prior to preparing the technical SOW and cost estimate.

With this knowledge and approach, the necessary data can be obtained to accurately and appropriately design and scope environmental impact for construction and avoid unnecessary delays and costs.

On the flip side, you also do not want the consultant to collect too much and/or unnecessary data (use SR 094 as example).

When preparing a tech sow, the consultant is expected to know and follow PennDOT policies and procedures for site investigations (Pub 281) and when DEP guidance and regulations become applicable. A reminder, PennDOT does NOT follow the ASTM standard for EDD, but there are similarities between this standard and Pub 281.

Environmental Consultant Responsibilities

- Implement SOW's
- Deliverables
  - Concise and complete
  - Define the end-product
  - Conclusion(s)

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It is the consultants responsibility, as well as the Dept's, to ensure the SOW is implemented as specified in their proposal and that and revisions to the scope of work are communicated to the Dept prior to implementation – out of scope work should not be completed w/o the Dept's approval.

The last bullet deserves some attention. Written documents must be thorough, complete, and concise – the last word here is key as I know that some clients believe consultants are "paid by the pound" of paper used in a report. There are some deliverables that are stand-alone and must detail all prior work. But most documents can rely on summarization of prior work, identify modifications to hypotheses in developing the scope, and interpret the data.

The last remark, 'interpretation' is important. The interpretation should be supported by the data collected. Make sure whoever is doing this work uses all the available data to interpret the findings, identify data gaps, and discuss the impact to the project. And relative to data gaps, they should be explained and justification for additional work, if presented, explained.

As described previously, the Department is responsible to set and manage the schedule. Relative to provide deliverables, it is the consultant's responsibility to provide the deliverables on time.

Lastly, you as the Department's representative must accept the report, but you may disagree with the consultant's interpretation. If there is a disagreement between the consultant and the District, the District's conclusions prevail and are presented in the report; the consultant can present their disagreement in an attachment to the report.

Management of Consultants and Projects

- Point of Contact
- Confirm Understanding
- Schedule – vs – Cost Estimate
- COMMUNICATION!!

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ON the slide here we've listed additional responsibilities that are shared by both the Dept and the consultant to aid with the management of a SI project, and ensure the project moves smoothly while the data to meet the objectives is collected.

1. A single point of contact is appropriate on both sides of the table. This way signals do not get crossed, and you don't have to rely on receiving second hand information that might have lost an important detail.
2. Even after the tech SOW has been approved, make sure your consultant understands the work that is to be implemented PRIOR to each phase of investigation – I know that this is something that should be expected, but taking a second look at the SOW yourself may ID potential data gaps that were missed in the initial scoping and can allow for making decisions on revising the SOW, as needed, ahead of time.
3. Track your consultants progress throughout the project. Assess percent complete versus the agreed upon schedule (timing) and budget allocation – for instance 75% of the budget is used and only 15% of the project completed. It is beneficial to set milestones throughout a project to confirm all is going as anticipated – this approach is beneficial b/c the budget on typical SI projects is usually front end loaded with subs.

Lastly, Communicate routinely with your consultant and require that they communicate with you. This factor is so important, that we've dedicated an entire slide to it…

We have found that communication among all parties, pm's, consultants, contractors, is crucial for any project. Therefore it is extremely important, especially for SI projects, to establish some ground rules to initiating the project. What do we mean by ground rules?? Here's some examples,

- Who is the point of contact on both sides of the table
  - It is important to know who to call for any situation. In our experience, it has been proven that a single point contact is most efficient.
  - It is also important to identify the key personnel involved in the project so that in the event the POC is unavailable, you can contact the person that is associated with the specific task.
  - Ultimately, we recommend that you set up a communications plan before the project is initiated so that all stakeholders have the information to contact each other. This plan could be as simple as a one page document listing key personnel, their function and their contact information.
- When setting up the "ground rules" of communication for a project, make sure you identify your specific expectations for communication….do you expect a phone call every day/week/month, or is written correspondence sufficient. Follow up with everybody involved in the project and make sure they are meeting your expectation.

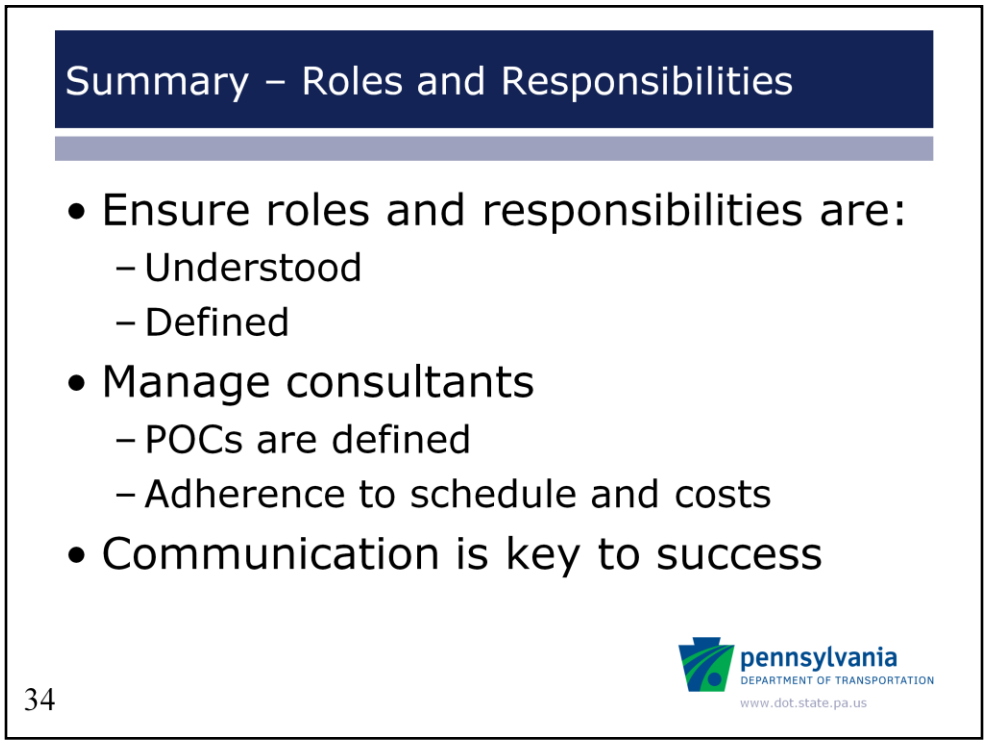
Single word with great importance – DEADLINES

It is always important to set deadlines and ENFORCE them.

There may be some flexibility in some deadlines, and clearly this is dependent on the needs for each specific job.

But more often than not, somebody is waiting for the information you are managing.

Establish the deadlines up from, understand the overall critical path of the data collection, and inform all stakeholders of the schedule and issues as they arise. Project problems and have consider the optional solutions. THIS is project management.



Time to summarize:

We have discussed that there are roles and responsibilities for the Department's project manager and the consultant, and why it is important that each of them understand and accept these roles.

We briefly discussed some of the important aspects of managing consultants. Part of this is to understand the consultant's organization, the project organization, and contact information of all stakeholders. Also, project delays can be avoided if adherence to the project schedule and costs are maintained, and if there are variations, to communicate them before they become a major problem.

And we've just repeated the last important item – the need to communicate throughout the process. On larger projects, this certainly is a key to ensure all consultants and PennDOT staff communicate through status meetings. But frankly, it can be the smaller projects where project schedules are compressed and funding is tight where miss-steps can cause a big impact – impacts that can be avoided.

Before we move on to the last part of the presentation, do we have any questions?

<<Questions>>

Remediation Planning, Implementation, and Reporting

- Pub 281 and Act 2 Relationships
- Typical remediation procedures
- Attainment of Soil Standard
  - Focus on SRS when tanks encountered in construction project

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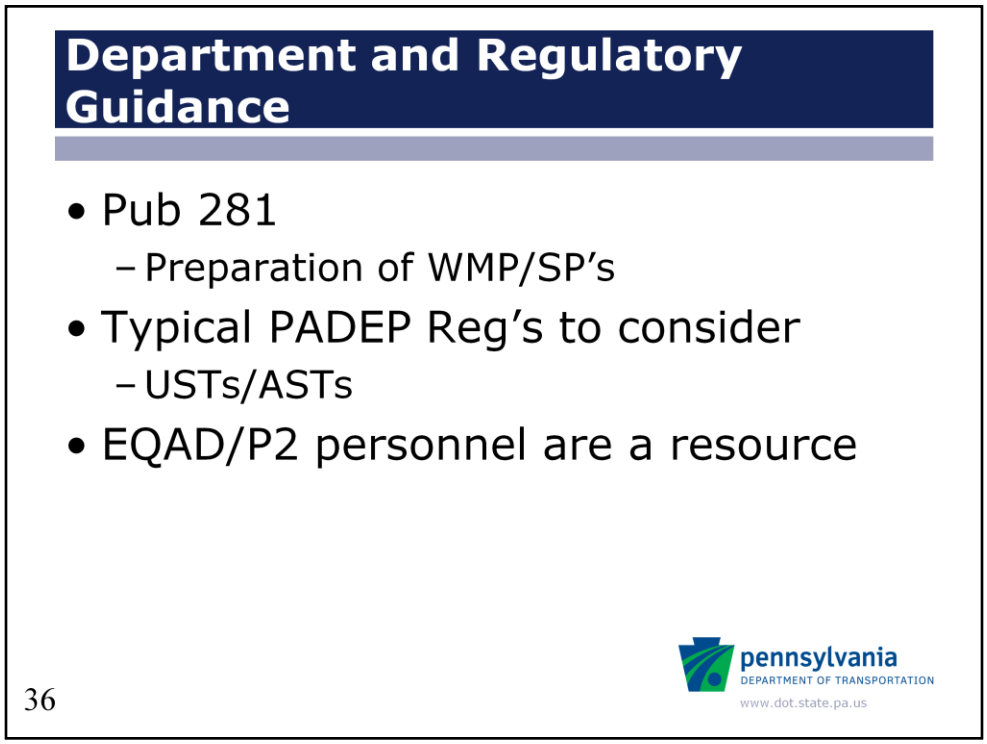
For the typical design, construction, and maintenance projects that we've discussed, you must consider various types of remediation techniques and the selection is based on the end use of the lands, the construction or maintenance techniques employed, and the contaminants and affected media.

The following slides summarize PennDOT's guidance and the applicability of PADEP's regulations and requirements. Bear in mind, as we have stated previously, this information will be presented more specifically in pub 281 refresher training (separate module).

Also, while we will focus on one specific procedure, the demonstration of closure of underground storage tanks in a required right-of-way, these procedures apply to a multitude of design, construction, or maintenance projects.



You've heard us state this over and over again throughout this training, Pub 281 is the resource that Dept personnel should follow for waste site evaluation. This resource, while there are some minor revisions underway, is up to date with respect to PADEP's current regulations and PennDOT 's policies.

What are the typical PADEP regulations that should be considered when performing a site investigation for one of these projects??

- Corrective Action Program or CAP are applicable to tank closures
- Underground storage tank regulations
- Act 2 is applicable because 1) it provides the criteria to evaluate chemical analyses and 2) in may be applicable for land divestiture
- Asbestos requirements of AHERA

Lastly, we also want to remind you that the P2 staff is a significant resource for dept personnel. They are up to speed on all of the appropriate regulations and policies that apply to these projects and have significant experience on all facets of site investigations; one of them is even a former regulator.

Typical Remediation Procedures

- Dig and haul
- Balanced project –
  - Re-use of excavated materials

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On this and the following screen are typical remediation techniques used for transportation projects.

We should emphasize here that to avoid the potential for construction delays, where possible the remediation of soil or friable asbestos can be/should be accomplished prior to the general construction.

So let's discuss some remediation techniques that you might expect.

One of the most common techniques is dig and haul – a title that is obvious. Where soil is impact has defined limits, the scope of work to excavate the contaminated soil and either dispose or reuse it can be readily included as a bid item in the PS&E. In fact, there have been times when a line item for contaminated soil excavation and disposal is included in the PS&E as a "just in case" where the potential exists for unexpected impacted soil discovered during a project.

Another type of common project is referred to as a balanced project, one where the engineers strive to have neither import nor export soil leaving the job site. If contaminated soil is present, then disposal costs combined with the need to import fill increases construction costs. This is the opportunity to potentially reuse lower-contaminated soil within the project. But this requires pre-planning and good communications, with the engineers and PADEP, to ensure the impacted soil is buried in the fill where there will be no future exposure – such as within an embankment. Your familiarity with the Pennsylvania management of fill policy is crucial to this objective.

This was accomplished on the Betsy Ross Bridge interchange and the SR 309 project and saved tens of thousands of dollars versus where contaminated soil generated on the project site would otherwise have required disposal in a landfill.

Typical Remediation Procedures

- Management of fill
- Tank Excavation and Removal

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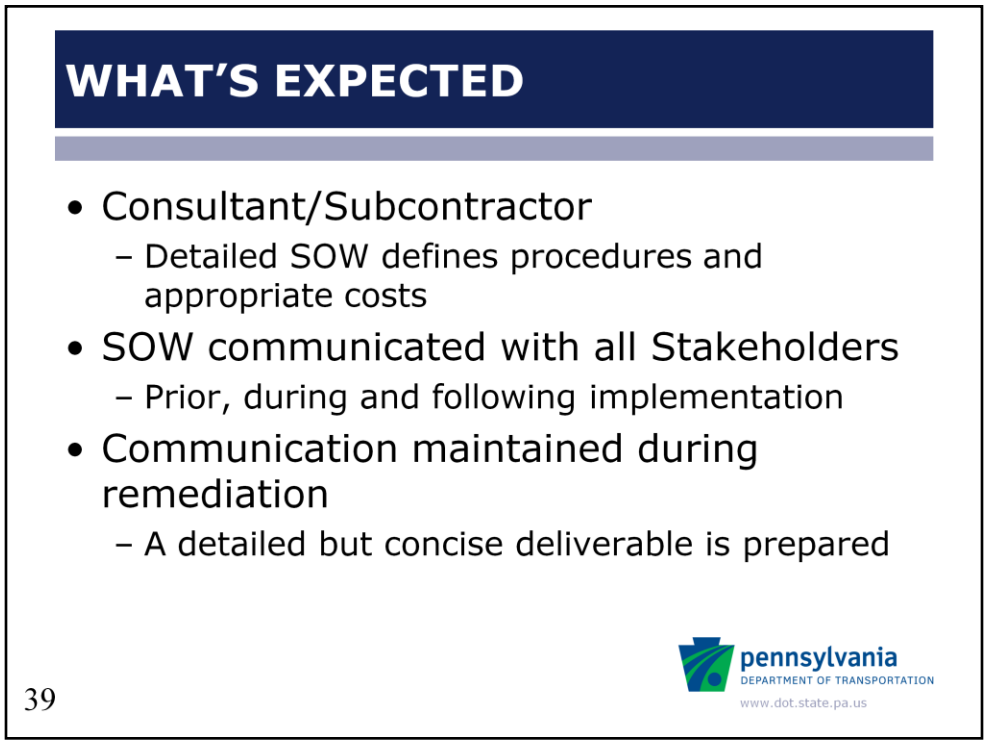
In the last slide, we mentioned familiarity with Pennsylvania's management of Fill Policy. This is where some knowledge of Act 2 and accompanying regulations are required to minimize environmental remediation costs and protect human health and the environment. You should understand that contaminated soil may NOT have to be disposed off site.

Similarly, you should have a working knowledge of the Management of Fill requirements. Publication 281 includes the background and references of this Pennsylvania requirement to assess the potential for soil impact if fill leaves the project site. Without spending too much time on this subject, the Management of Fill policy requires environmental due diligence to be completed if excavated soil will be exported. This policy requires that if contamination of the soil is suspected, chemical analyses is required, and depending on the results, certain uses of the exported soil may be prohibited. But if no contamination is suspected, it can be exported as Clean Fill.

So, here is where advanced planning can be helpful – where perhaps contaminated soil can be reused on site and un-impacted soil can be exported to meet the balanced job requirements.

The last common waste issue on PennDOT projects is closure of USTs in a project right of way. This is typically accomplished by excavation and removal, and it must be completed consistent with PADEP's requirements which include reporting of a release, if present, using the spill hot line.

There are minimum sampling requirements for a clean closure, and standardized reporting for tank closures regardless of whether fuel impact is present or not. We are going to discuss other sampling if fuel-impacted soil is identified at a tank closure a bit later.

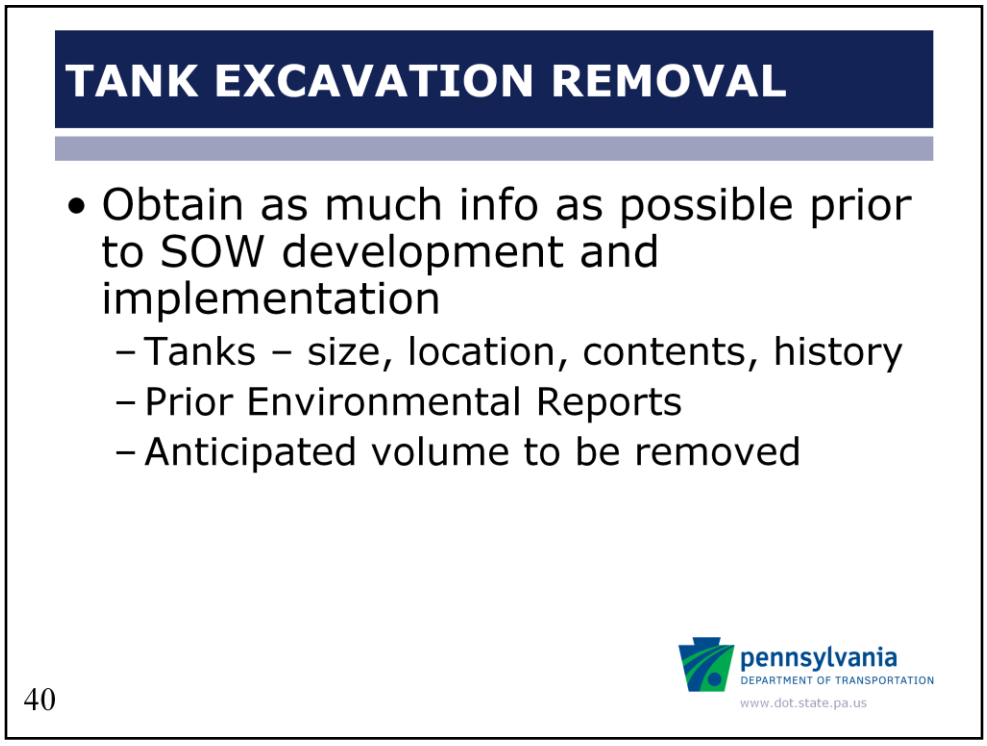


Similar to site investigation project, there are expectations of the Department and consultant/contractor personnel on remediation projects.

Detailed scopes of work must be prepared that define the costs, schedules, and expectations.

This scope of work and schedule must be communicated throughout the remediation effort. For example, if contaminated soil reuse is proposed. Make sure all stakeholders are clear on the objectives, schedule, health and safety and reporting requirements.

These are vital to the preparation and acceptance of a deliverable. And you should be aware that the management of contaminated soil within the project site requires an "as-built" representation of where these materials were used.



The closure of USTs in a project site are very common, and our emphasis on this subject is based on the need to have PennDOT perform this work appropriately and consistently.

As the first bullet states, knowledge of the tank or tank system to be closed will better prepare the contractor to implement the closure and remediation more efficiently. The Phase I, II, or III SOWs should have defined this information, the number of tanks, size, whether residual product is present, etc, prior to the PS&E package preparation. Also, information on tank ownership is important if the tanks are partially within the right of way – where the Department will not take ownership of the tanks, but must address the contaminated soil that impacts the project. The more information obtained up front, the less of a chance you have for delays during construction.

Specifically, and this may seem obvious – you'd be surprised, how many 'unknown' tanks are discovered during construction. This is the point of the Phased environmental investigations – to identify potential environmental concerns and plan for them. Information such as historical reports, registration, and environmental investigations associated with these tanks that can shed some light on what is to be expected (i.e. contaminated soil, gw, free product…).

TANK EXCAVATION REMOVAL

- Dept Policy – Post-Excavation Sampling to Achieve Closure
  - SRS will be implemented

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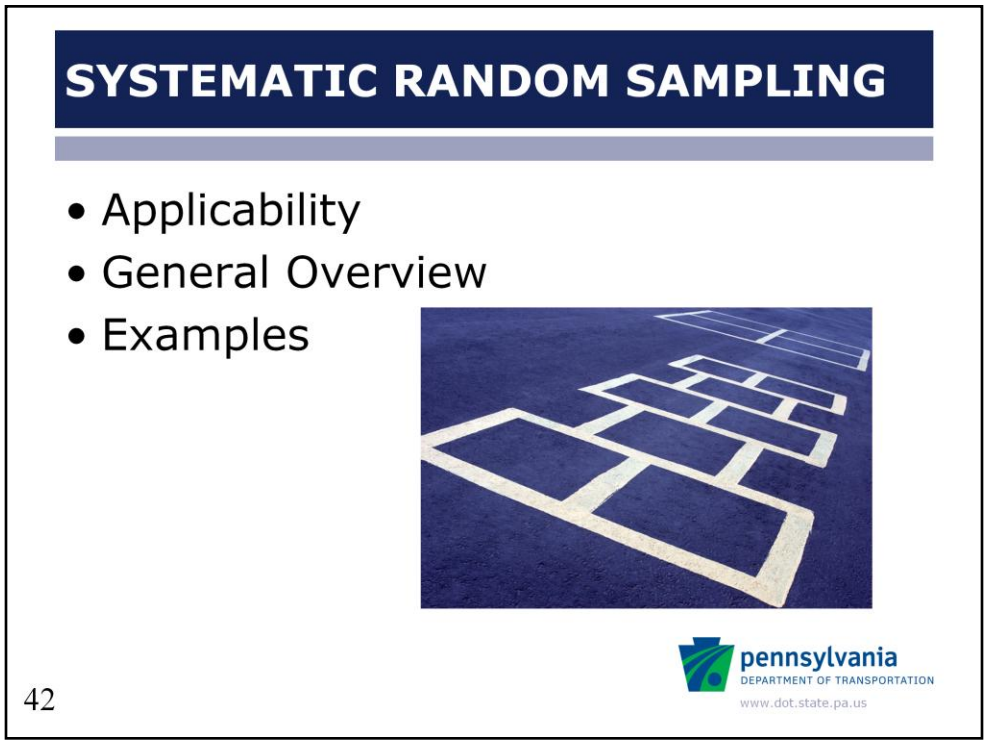
The phased investigation should allow an estimate of whether the tank closure will be clean or fuel impact is present. And if present, the approximate volume of soil that will be REQUIRED to be removed for the proposed remediation. Remember, PennDOT is performing a transportation construction project, not chasing a plume outside the project right of way to confirm "clean for somebody else". This is the type of issue that could be addressed with DEP before the construction starts.

As mentioned earlier, there are specific minimum post-excavation sampling required for a tank closure. If impacted soil IS identified, it is the Dept's policy that you implement systematic random sampling pursuant to PADEP's Act 2 guidance (Chapter 250.703)

This is covered on the next couple of slides.



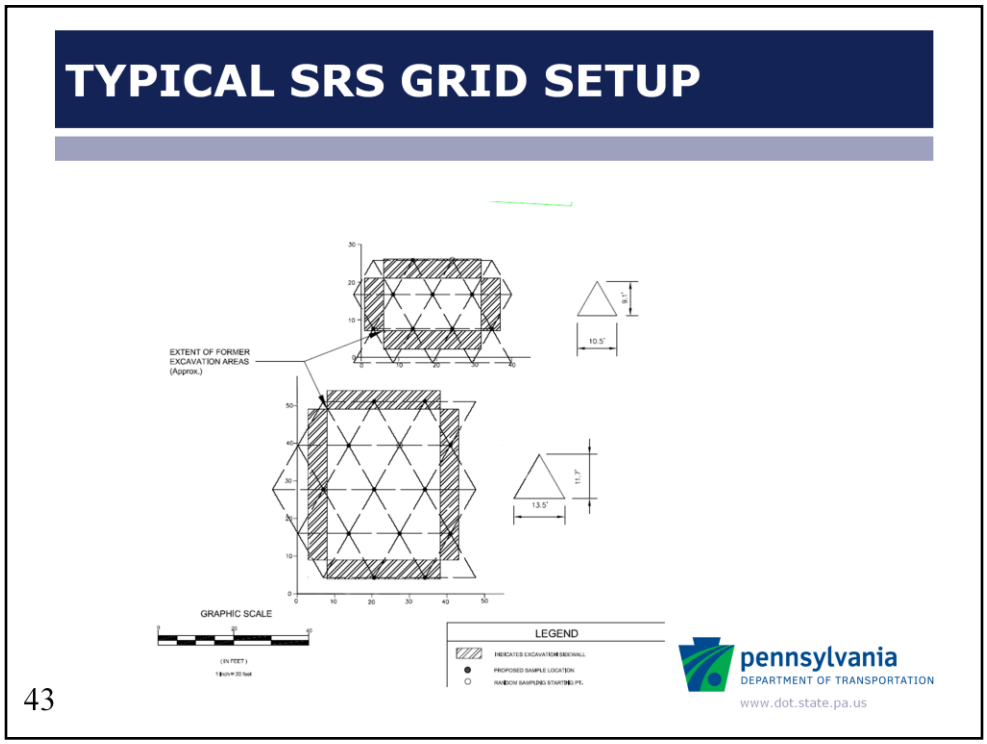
The systematic random sampling policy is for tanks, but can be applied to any remediation involving the excavation of contaminated soil. systematic random samplings the implementation of a sampling program that yields a statistically-valid representation of the effectiveness of remediation through collection and analysis of soil samples. There is NO bias of judgment allowed in the selection of sample locations. This methodology:

1. Gives PennDOT a better chance of “closing the loop” on a minor remediation project,
2. It removes opportunities to ‘second guess’ data interpretation or sampler bias, and
3. Allows for minor “hits” above the remediation standard yet obtain clean closure.

For these reasons, it is highly suggested that you contact pollution prevention section staff to review and approve a systematic random sampling plan before it is implemented; but please note, this is not required. If you are planning to remove tanks as part of a construction project and have collected sufficient information on the site conditions, you will know ahead of time the extent of impact and the expected volume. So, this review should not be problematic.

If the unknown tank is discovered during the construction project, call the pollution prevention section immediately and they will assist with setting up an appropriate systematic random sampling for you; the project consultant can assist, but the PPS should also review this prior to implementation. For your reference, the specific approach to preparing and implementing a systematic random sampling has been added to the recently revised Pub 281 which will be available to Department Personnel in 2010.

The following slides provide examples of how a systematic random sampling plan is prepared for an excavation

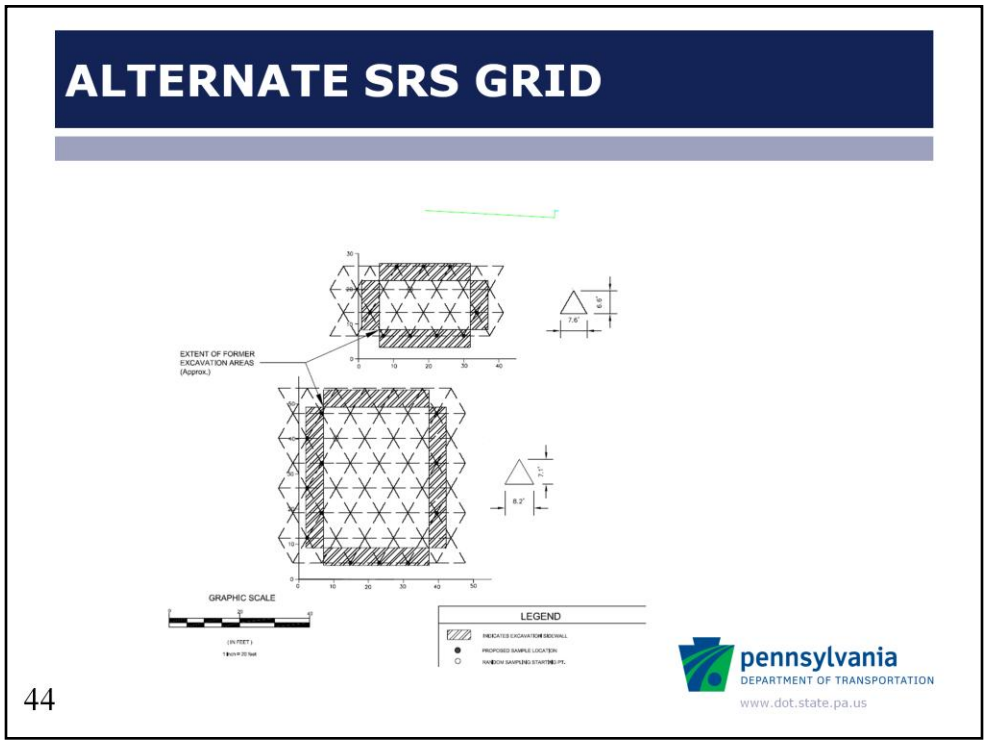


Essentially, the number of samples is determined by the volume of impacted soil removed for remediation. For example, for an excavation with up to 125 cubic yards, 8 samples are required. The analytical program is also based on the tank contents, and therefore historic use of the tank must be known. The example provided above shows two excavations: 1 where the total volume was less than 125 CY and the other (obviously the larger of the two) where the total volume was greater than 125 CY. The spacing of these grids was developed using PADEP's guidance provided within the "technical tools" section of the Act 2 page. Basically, this tool allows you to input the size of the excavation and volume of soil removed, then it will provide the appropriate grid spacing necessary to obtain the required number of samples

The excavation is drawn, to scale, in a one-dimensional plane folding sidewalls flat with the bottom of the excavation.

A grid is established consistent with the side of the excavation and the grid lines are connected to establish potential sampling points or nodes. A random number generator is then used to determine the starting point of the grid and the remaining samples are collected at the spacing developed by the systematic random sampling worksheet.

What's provided on this slide is what you should expect from your consultant that is overseeing the excavation and soil attainment sampling activities. We recommend that you require the consultant to provide this information prior to implementing the sampling.

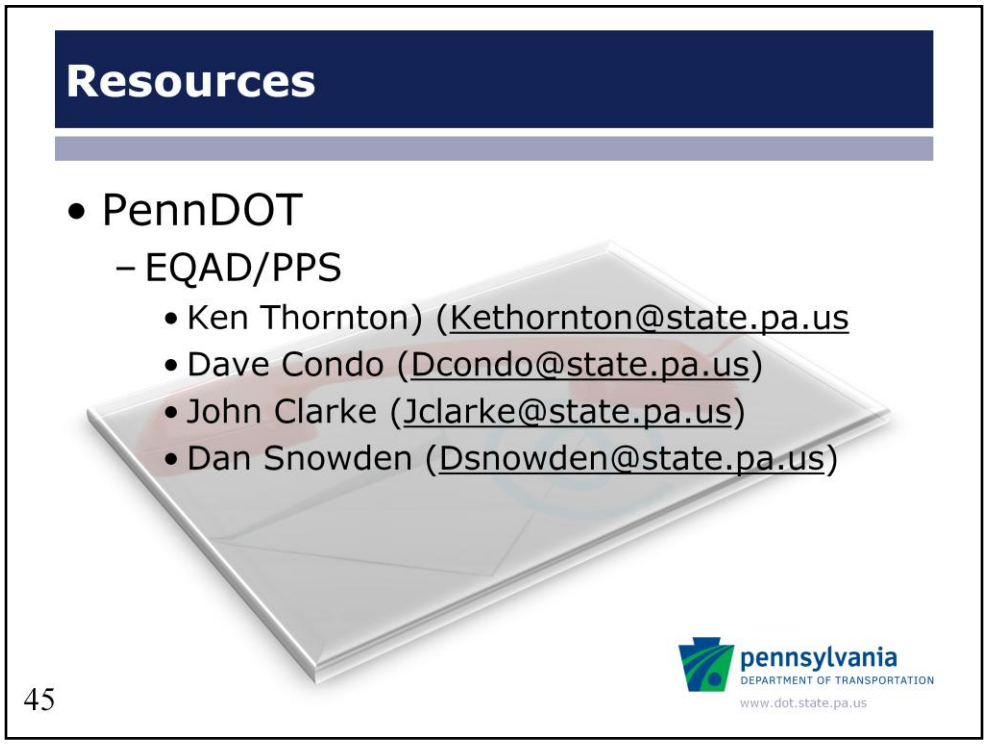


As I'm sure you all have encountered, not all excavations are perfect. You might run into vertical "obstructions" like the presence of groundwater. In this case, there is an alternative approach to pursuing attainment sampling which is acceptable to PADEP.

This slide represents the alternative systematic random sampling grid set up where the groundwater is present at the base of the excavation. In this case, the same number of samples are required to be collected as if groundwater was note present, however, because groundwater prohibits the collection of samples at the base, the samples are collected from the sidewalls only.

If you collect the samples for the base of the excavation under this scenario, a different set of Act 2 criteria has to be applied (1/10 of the respective constituent criteria) since the soil is saturated. Note that this is applicable even if the excavation is dewatered.

Therefore, you may want to focus on the sidewalls to implement SRS procedures in this scenario. As you can see, the sampling points fall within only the sidewalls.



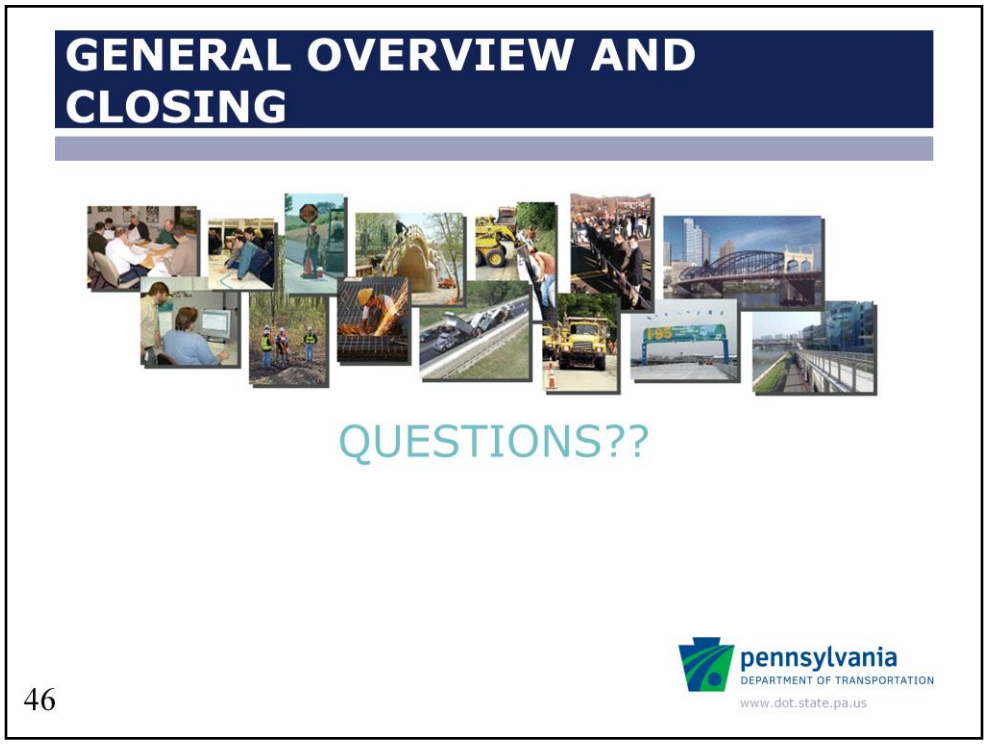
That was relatively quick overview of data that has been developed considering multiple PennDOT projects in all of the PADEP regions. Yes – it was generic in some areas, and I am sure that each of you have some examples of projects that 'do not quite' apply to the items discussed today.

And our answer is – yes, there will be differences. There are pressures by legislatures and management to keep the project moving and the costs in control. There is pressure from contractors to make a decision, and there are likely public pressures.

The PPS has developed Pub 281 and the procedures discussed today to better insure that environmental issues are properly assessed and addressed.

No doubt some questions will arise when you are working on a specific project, and you should know there are resources to help you make decisions. On this slide is contact information for the PPS and Apex.

We have a wealth of knowledge for you to draw from for SI's and we recommend you contact them, as needed, when a SI is being scoped and/or implemented to aid you with the process.



That concludes our presentation of Site Investigation topics for today.

I want to remind you that this touches upon some of the elements that are included in the Publication 281 training that is conducted as a separate class – check the PennDOT calendar for this course offering.

At this time, I want to open it up for questions. As we discussed in the beginning of this webinar, you can submit your questions to your location's proctor and they will submit the questions. We will read and answer the question so that everyone can hear us. So, take a moment to submit your questions and in the interim, I will check whether any have been submitted while we have been presenting our topic.

<Pause>

Well, on behalf of the Pollution Prevention Section/Environmental Quality Assurance Division of the Bureau of Environmental Quality, I thank you for your time and hope that you garnered additional insight on site investigation topics that PennDOT routinely faces.