SampleServe

> ### What does an IDEAL environmental data management system look like?

That's the question nearly everybody in the environmental industry is asking in these digital days. As you might suspect, the answer is different depending on the particular user's working perspective.

__Project Managers - Setup/Scheduling__ - A Project Manager whose job is to plan and coordinate field activities wants an easy to use and easy to schedule system that doesn't require repetitive data entry and multiple methods of communication. They want to set up a particular OM&M event, whether it's sampling or remediation system maintenance and they want the communication to all relevant parties to be automatic from that point on. Having separate communication methods for the lab, for the field techs, and for the site owner, takes time and causes potential miscues. If a schedule or work scope has to be changed, those changes should permeate across the communication system to the relevant parties automatically. Information that each party should know should be updated. Miscues, faulty sample bottle orders, or misunderstood or unclear work scopes cost time and money.

__Field Technicians__ - An OM&M Field Technician wants a simple to understand work scope that tells them exactly where they need to be, when they need to be there, what they need to do, and what they will need on hand to get the job done. It's shouldn't be a herculean task to compile all this information in a clear and concise manner either. It should be ready, complete, and easily understood. Poorly communicated work scopes lead to wasted time and poor work performance. This work scope should tell them how much material (tubing, bailers, etc..) they will need for a particular work scope. It should indicate how many sample bottles and of what kind they need on hand before they leave for the job site. When on site, it should tell them which order to sample in (clean to dirty) and what they will be sampling for at each location. If on-site with other technicians, it should show them the progress and status of the other technicians so they can operate with maximum efficiency. Communication and status updates to the Project Manager from the field should be easy, clear, and automatic.

__Laboratories__ - Laboratories want sample bottle orders to be placed in a timely fashion so that they can minimize shipping costs and the stress involved with overnight, "emergency" bottle orders and the often-forgotten, QAQC bottles needed, but not ordered. Laboratories also want a view into the future. They want to be able to see anticipated sample volumes for tomorrow, next week, and next quarter. Having forecast data on sample containers needed will help with inventory and costs. Will they get a "Rush" or a "short hold" sample on Friday? The ability to see incoming samples ahead of time would be beneficial to their scheduling department. Sample bottle login is also wrought with problems. Most labs refer to the morning drop off of coolers by the various shipping companies as "triage". It's the frantic opening of all the coolers looking for the paper chain-of-custody so that they can identify the rush and short hold time samples so they can be pushed to the front of the line. Labs would love to have a simple process where they could identify rush and short hold time samples without even opening the coolers. Labs would love a system that automatically enters all sample container and sampling information into their LIMS system without having to manually enter data from a handwritten paper chain-of-custody. Poor penmanship is the source of many problems at a laboratory.

Project Managers - Reporting - Report writers want a platform that allows them to be in control of their own report production destiny. They don't want to have to farm out to other departments, offices, or staff, work that they should be able to do themselves. Bottlenecks in report production are created by the current traditional methods because of software that is complicated to use, requires years of training, and is limited by the number of licensed users at an organization.

Prior to the invention of the word processor, professional text documents were either dictated or handwritten and then given to others to type up on a typewriter. The word processor made it so that the majority of professionals now create their own documents. These process funnels for document preparation caused production backups and increased costs then, and graphic production process still does now.

Environmental Project Managers responsible for report production, want graphic and data imaging to transform in a similar fashion as word processing did then. Meaning, make it simple enough that anyone can do it.

Most Project Managers also believe in the old adage, "a picture is worth a thousand words", or in this case a dozen tables. As graphics and imagery become easier and simpler to use, data tables utility becomes diminished. Data trends, data locations, data exceedances, are conveyed simply and easily understood using graphics. The human mind is much more adapt at understanding and interpreting imagery than it is in evaluating raw data. The data table is still relevant, just less relied upon. Tables have traditionally been popular and used as the go to data deliverable in the industry because graphics have been expensive and time consuming to produce. Project Managers want a platform that produces quality graphics and imagery that is simple to learn, easy to use, and produces a plethora of quality graphics quickly.

End Users/Clients - Any corporate client environmental manager in charge of looking out for their company's environmental liability wants to be able to quickly view the status of any project in their portfolio. They want to see all the work that is ongoing; they want to see what work is scheduled, they want to see the results of work that was just completed, even work that was completed today. They particularly are interested in seeing results quickly in the event of any incidents or in the event of a pending property transaction. They want instant access to site details and analytical results and the resulting imagery that is going to quickly tell the story of the site conditions. They also want a system that has built in data alarms which indicate critical data issues, exceedances, or violations.

Corporate Environmental Managers want a platform that allows them to spot check any given engineering consultants work themselves, quickly and easily. The system should allow them to have access to their data anytime they want and also be able to let them generate the same graphics and images themselves, should they choose to. There may be instances where the time delay and costs involved don't warrant getting the consulting engineer to produce the graphic or image for them. If it's simple enough, the image could be produced in the time that it takes to send the email or make the phone call to ask for the update.

SampleServe

➢ **Background of SampleServe, Inc.**

When SampleServe first started back in 2001, the goals we had for the company were completely different than the goals we have now. In 2001 we were a "field services" company and that's all we wanted to be. Back then the internet was just gaining momentum and not many people were comfortable having their data online. As a matter of fact, many were outright opposed to it.

Shortly after we started, SampleServe developed an online data management tool to help facilitate our own sample scheduling and sample data collection. You see, filling our sample bottle labels and completing chain-of-custodies on 3-part triplicate forms was time consuming and prone to errors and legibility issues. SampleServe had a different business model right from the beginning. We charged all-inclusive unit rates for sampling and rarely if ever billed by the hour. So being efficiency and unit-minded, we wanted to be able to lay out a project and print chain-of-custody's, sample bottle labels, and sample location maps, ahead of time so that our own field staff could sample quicker and with fewer mistakes. Mistakes cost time to correct, so fewer mistakes and efficient planning meant time saved.

One of our programmers back in 2002 or so suggested that letting our clients access their own data tables which we developed might be helpful. After all, we had all the field data and entered it digitally so this would be a great "value add" for our clients, so we added it. Generating simple graphs from the tables was a natural offshoot. Again, we still saw ourselves as a field services company and the data tables and graphs reporting was simply extra value that separated us from other companies.

Over the years our data reporting got better, and we slowly added additional features like adding lab result data to the platform and then generating data box maps and then various contouring functionality. It was in early 2011 while meeting with a large international engineering company to discuss performing groundwater sampling for them that they indicated that they might be interested in just using our software. You see they wanted to keep doing their own sampling, but they liked the simplicity and organization of our software. Our response to them at that time was, "No, we are not a software company". It had been suggested before, but never so seriously. After some thinking, it occurred that maybe we should let people just use our software. We knew it was useful and other people seemed to like it. That was the beginning of SampleServe taking on its identity as a software company. It took about a year of bootstrapping to fund the costs to revamp the software to allow clients access and set up their own projects (i.e., print their own chain-of-custodies and sample bottle labels, etc..) but when we completed it, we were officially a software company.

This deep industry experience in both managing sampling projects and actual sampling in the field has allowed SampleServe a unique industry perspective. We understand the pain points of each user in the data cycle. We understand the intricacies and variability of data collection and the different sampling techniques. The flow of data is important to the success of the project. A project work scope that is not successfully set up leads to a sampling event that has issues or is missing key data points. The failure to order sample bottles on time or to order the correct number and type of bottles is a chronic problem in the industry, ask any lab. Samples that weren't collected or were collected improperly or are missing key field data leads to issues with reporting.

The key to successful project is to understand the data cycle and how that cycle originates and how that data moves from one user type to another. Failure to account for each of the user types and their particular data needs, means that the resulting report will likely be lacking in sufficient detail.

➢ **The Business Case for Using SampleServe**

    a. <u>Data Cycle</u> - The SampleServe software platforms is design from the ground up to account for each of the user types in the environmental project data cycle. Each user group has specifically designed functionality for their particular data needs. Data is digital right from the start and stays digital for repeated cycles and reporting. No paper necessary.

    b. <u>User Collaboration</u> - Collaboration amongst users is simple. Each project has unlimited users and a list view into who has access and at what capacity. Invitations are easily sent inviting people to a single project or a group of projects. Should a project change management between consulting firms or just individual project managers, it's simply a matter of inviting and uninviting certain users.

    c. <u>Bottleneck Elimination</u> - With the SampleServe platform, report production bottlenecks are eliminated. With most other report production platforms (GIS, AutoCAD, etc..), only certain users have access to the software and/or the skills to generate the needed graphics and images. The SampleServe platform is designed to be intuitive and simple. Training of <u>all</u> aspects of the platform typically takes a total of 3 to 4 hours. Any user with a basic understanding of environmental principles and the investigation and reporting process, can be up and running and proficient with the platform in less than one day. Many users require little to no in-person training as self-training can be conducted via our collection of "how to" videos that are available for each aspect and feature of the platform. When bottlenecks are eliminated, work gets done more efficiently, it gets done faster, and more time is spent on problem evaluation and creative solutions.

d. <u>Data Integration</u> – Historical data can be pulled from any number of current existing enterprise platforms. Files can export from those platforms and uploaded directly into SampleServe simply and easily. Most of the time this is a simple data file drag and drop process. Data can also be exported from SampleServe at anytime and uploaded back into those same platforms. This can be done either via a manual export/import function or a more automated Application Program Interface (API) function. APIs can be built and then utilized for the automated export/import. Cooperation and permission for the selected enterprise platform will be required for the automated API export/import function to work.

e. <u>Simple Fees</u> - <u>SampleServe fees</u> are based on project sampling and reporting activity. There are no sign-up fees, no monthly or annual fees, and no fees based on the number of users. You can have as many users as needed for a successful project; you decide. Because we bill by the sample, small projects have small fees and larger projects have larger fees. SampleServe fees are very predictable and affordable.

f. <u>The Billable Hour Business Model</u> - The SampleServe business model is a basic all-inclusive unit rate based on the number of samples collected, which is determined by a separate third-party based on scientific need. Unlike a lot of work products and working scenarios in the world the predominant business model in the environmental industry is "*time and materials".* This under this model, efficiency is punished, not rewarded.

g. <u>No Fees for Dormant/Inactive Sites</u> - When a project is dormant or in a natural attenuation phase and only being sampled once per year, the fees charged only occur proportional to the sampling activity. While a site is pending closure of has been closed pending monitoring well removal, there are no fees associated with that site. Fees are only charged when samples are collected. The data availability and reporting functionality remains active for 18-months after the last sample has been collected. No projects or data will be removed or archived without notice to the account holder and able opportunity to download and archive all existing project data.

h. <u>Cost Savings</u> – The cost savings from project to project and even sampling event to sampling event will vary. However, the increased efficiency will transcend all types of projects and all types of OM&M activities. A typical quarterly sampling event is summarized below using "*time & materials, billed-by-the-hour*" method using the traditional project management tools and GIS/AutoCAD techniques for preparing reports. It's then summarized using the SampleServe software platform and mobile field app again using time and materials.

	# Samples:	Traditional T&M			SampleServe			% Savings
	10	Cost Per Sample:	**$361**		Cost Per Sample:	**$174**		**52%**
Work Catogory	**Staff Level**	Estimated Hrs/Units	Billable Rate	Cost	Estimated Hrs/Units	Billable Rate	Cost	
Set-Up/Scheduling	Project Manager	3.0	$125	**$375**	1.5	$125	**$188**	50%
Goundwater Sampling	Field Tech	12.0	$65	**$780**	10.0	$65	**$650**	17%
Report Preparation	Project Manager	16.0	$125	**$2,000**	6.0	$125	**$750**	63%
AutoCAD/GIS	AutoCAD/GIS Tech	6.0	$75	**$450**	0.0	$75	**$0**	100%
SampleServe Fees	*Per Sample*	0	$0	**$0**	*10*	*$15*	**$150**	0%
				$3,605			**$1,738**	**52%**

These types of numbers and savings ranges have been verified by multiple current users. In fact, the more samples that are collected and reported in an event, the higher the savings percentage rises. Our management and reporting takes just seconds per event no matter how many samples are collected or how much data is involved, whereas, using traditional methods, the unit of time is proportional to the number of samples. The more samples collected and requiring to be reported on using the traditional GIS/AutoCAD techniques, the longer the data entry and reporting takes.

i. Due Diligence Projects - Phase IIs - The SampleServe platform is an excellent tool for managing, scheduling, coordinating sampling during Phase II due diligence projects. It's especially useful when large volumes of properties are being investigated simultaneously. Historical data is easily uploaded and then augmented by new data during the field investigations and transaction. It can then also seamlessly transition within SampleServe for additional ongoing work and sampling if needed.

THE SAMPLESERVE PLATFORM

➢ **The Project Management Tool** saves 40% to 60% of a Project Managers time on scheduling and communication.

   a. Setting up projects is simple.

   b. Most users can be trained on the project management tool in 30 – 60 minutes.

   c. Setting up a new project.
      i. Historical field data and lab data can be uploaded easily. Numerous data formats are supported, and new data upload formats can be created quickly. Most data upload is simply a drag and drop process.
      ii. An unlimited number of sample location maps and sample location images are available per project. These images can be created and uploaded quickly. Line-drawings, google earth images, cross-sections, photographs of remediation systems or excavations, can all be uploaded and resulting field and lab data superimposed as a data layer on those images. Google earth sample location maps can also be created quickly and easily from GPS coordinates.
      iii. Sample location and well construction information is easy to upload and set-up. Numerous data formats are supported, and new data upload formats can be

created quickly. Most data upload is simply a drag and drop process. Placing sample locations and the various maps and images is also simple and quick.

    d.   Sample Event/Work Scope creation and scheduling is easy.

        i.   Selecting the lab(s) for a project or sample event is easy and quick. Once a lab is selected, the analytical parameters and sample bottle details (size, type, preservative, etc..) are generated from the lab's specified menu. This menu is populated and updated by the specific laboratory.

        ii.   The Project Manager then schedules the sampling event target date and specifies which locations are to be sampled and which parameters are to be collected at each location. Once created, the Project Manager simply saves the work scope, and both the invited laboratory and the invited field technicians see the schedule work on their respective calendars.

        iii.   Once a sampling event work scope is created and saved, sample bottle ordering is handled through the platform automatically. A reminder email and work scope acknowledgement and confirmation are sent to the Project Manager 2 - weeks prior to the schedule sampling event. The Project Manager confirms the work scope, and the bottle order is then placed with the laboratory in plenty of time to fulfil the order without the cost of Rush shipping and handling.

➢ The **Mobile Field App** saves Field Techs roughly 20% of their time in the field.

    a.   It's simple to use. Most users can learn the operation and how to collect samples and record data in 30 – 60 to minutes.

    b.   Detailed sampling instructions/work scope is quickly and easily downloaded to the device.

    c.   The App automatically sorts sample locations from clean to dirty. A valuable sample integrity and quality control measure.

    d.   All field data including, photo's, GPS, and low-flow sampling data are collected and stored on the device. The data is synced to the cloud automatically without any special action needed. Simply connect to Wi-Fi or have a mobile data connection.

    e.   The App prints sample container labels in the field at the time of sampling. Each label is uniquely identified with all the standard information needed for a typical sample submitted to a lab. The app also prints QR coded sample cooler custody seals with all the project information on them as well. This allows the lab to view the contents of the cooler, without having to open the cooler(s).

    f.   The platform allows multiple field techs to collaborate in the field in real time and allows visibility to the Project Manager anywhere, in real time.

g. The Field App generates a detailed digital chain-of-custody (D-COC) as a data file and as a PDF and automatically communicates all sample shipment information to the laboratory in real time. The PDF version of the COC looks just like a typical COC and can be printed and used as a paper version of the COC at any time.

➢ The **Lab Login App** saves laboratory staff over 50% of their time on the sample login process and significantly reduces data entry and transcription errors.

a. The lab creates an account on the SampleServe platform and enters lab analytical parameter menu and bottle/size/preservative details into the SampleServe platform. The lab also establishes lab contacts/accounts. Lab customers can then select that lab from the platform and pick their required analysis from the lab's parameter menu. Then sample bottle orders can be placed from within the platform (optional, not required).

b. The Lab Login App can view incoming Chain-of-Custodies as they are generated in the field, a day before the coolers arrive, and they can view those COC's for rush samples or samples with short hold times. This allows labs to plan and schedule with more efficiency.

c. Upon, cooler arrival at the lab, The Lab Login App can scan the custody seal on the outside of the cooler and view the COC and verify the contents of the cooler and expedite when needed.

d. The lab can receive the samples using the 3-part digital chain-of-custody acceptance process that is built into the Lab Login App.

e. The Lab Login App also has a lab customizable lab sample login check list that can speed the login process and document sample container details and condition upon sample arrival. This lab login checklist becomes part of the record and can be shared quickly and easily from the platform. No scanning of paper documents required.

f. All sample details are included in the D-COC data file. To assure receipt and inventory of all sample containers upon arrival at the lab, a Lab Login App feature scans the unique sample bottle label QR codes on the lid of each sample container. This scanning confirms receipt and inventory of all uniquely identified sample containers. This process can also be completed manually by selecting sample container check boxes on the lab login app. Exceptions to the inventory, like broken bottles or missing containers, can also be identified and noted.

g. Once all containers have been accounted for or noted, the completed chain-of-custody data file can be exported to the laboratories information management system (LIMS) either through a manual data file upload or through a lab customized API upload feature. Cooperation and permission for the lab LIMS system will be required, for the

automated API import function to work. Copies of the completed COC and Lab Login Checklist can also be shared instantly with clients and other designated parties.

h. Once lab sample analysis is completed, the lab manually uploads results back to SampleServe platform via a formatted csv. file "drag and drop" or email the data back to the client or SampleServe for upload (labdataupload@sampleserve.com). Alternatively, lab data can be automatically uploaded back to the SampleServe platform via an API. Cooperation and permission for the lab LIMS system will be required, for the automated API import function to work.

➤ The **Report Generator** function saves Project Managers that are responsible for report preparation up to 70% to 90% of their time generating graphics and images for the reports. From a report preparation cost perspective, most costs involved are associated with the preparation of the graphics and images.

   a. Graphics that can be created include
      i. *Data Box Maps* -Options for a data box map include an unlimited number of versions of data box maps. Each version can be individualized to present sample locations, sample dates, analytical parameters, and clean-up comparison criteria to color code against. It's also easy to adjust size and placement of each presented data box.
      ii. *Groundwater Flow Direction Contour Maps* -Options for groundwater flow contours include an unlimited number of versions of the flow contours maps wanted. Each version can be individualized with the number of contour intervals wanted, different dates, and data points utilized and whether direction flow lines are desired or not. Different maps can be created for different aquifer units.
      iii. *Iso-Chemical Contour Maps* - Options for iso-chemical contours include an unlimited number of versions of the contour's maps wanted. Each version can be individualized with the number of contour intervals wanted, the data points utilized, the dates contoured, the individual or groups of chemicals wanted, and whether the image is a heat map or just presented as colored contour lines. Different maps can be created and saved for different chemicals if desired.
      iv. *Free Product Contours* - Options for free product contours include an unlimited number of versions of the free product contours desired. Different maps can be created for different dates and different locations if desired.
      v. Analytical Graphs - Options for analytical graphs include the selection of sample locations wanted, the individual chemicals wanted, and the dates wanting to be graphed.
      vi. *Groundwater Elevation Graphs* - These graphs show groundwater elevation relative to the well-screen interval of a monitoring well. Options for elevation graphs include the selection of dates wanted, the individual locations wanted and whether free product thickness and elevation, if present, is also indicated

on the graph. These graphs are great for determining long term trends and if free product can enter the screened interval.

      vii. *Combination Graphs* - Options for combination graphs include the selection of locations wanted, the individual chemicals wanted, and the dates wanting to be graphed. Groundwater elevation is also displayed on the same graph with chemical concentrations. These graphs are great for determining if there is a correlation or causation with groundwater elevations and resulting chemical concentrations. Sites with residual soil contamination in source areas are easily identified using these types of combination graphs.

      viii. *Field Data Graphs* - Options for field data graphs include the selection of locations wanted, the individual parameters wanted, and the dates wanting to be graphed.

      ix. *Analytical Data Tables* - Options for analytical data tables include the selection of locations wanted, the individual chemicals wanted, and the dates wanting to be graphed. Up to three different clean-up comparison criteria to color code against can be selected and used to compare sample result exceedance information.

      x. Field Data Tables - Options for field data tables include the selection of locations wanted, the individual parameters wanted, and the dates wanting to be graphed.

b. Multiple versions of standard images listed above can be created. An unlimited number of maps and images are allowed per project and data visualization preferences can be populated and saved on each version of the image so that the generation of that image can be reproduced even quicker after the next sampling event. For instance, you may want a basic site map to show groundwater flow from wells placed in different aquifers. You would simply create a map image for the upper aquifer and then create a separate map image for the lower aquifer. When preferences for each image have been saved, the generation of an entire report for an average project can typically be completed in approximately 10-mins.

➢ Data Integration with **Enterprise Platforms** (EQUIS, ESRI, ENFOS, others).

a. Historical data can be pulled from any number of current existing enterprise platforms. Files can export from those platforms and uploaded directly into SampleServe simply and easily. Depending on the client and the platform, some data export mapping may be required but this mapping can typically be accomplished in 1-day. Once a data export file type is mapped, it becomes a simple data file "drag and drop" process into the SampleServe platform. In fact, dozens of projects have been uploaded to SampleServe from EQUIS using the drag and drop process. The record "drag and drop" upload of projects from EQUIS is 33 projects in one day, by one person.

b. Both field data and report images can also be exported from SampleServe platform at any time and uploaded back into those same platforms. This can be done either via a

manual export/import function within those platforms with a reverse file mapping or a more automated Application Program Interface (API) function which can be utilized.

c. APIs can be built and then utilized for the automated export/import. Cooperation and permission for the selected enterprise platform will be required for the automated API export/import function to work.

SAMPLESERVE FUTURE

➢ SampleServe was built on innovation. This innovation includes both process innovation and digital innovation. Future **Features and Products** that SampleServe is currently developing include:

a. *Enhanced "Forms" Functionality* - SampleServe currently has a custom forms capability. Custom forms can be created using the project management tool and those forms are pushed to the Mobile Field App for completion by the field personnel on a per project and per sample location basis. SampleServe is expanding the forms capabilities to allow for increased variability for data input types within each form (GPS, Photos, Video, etc..) and to also allow for multiple forms per sample location if desired by the user. These increased forms functionality types will increase the utility of the field app for expanded OM&M activities well beyond sampling.

b. *Customizable User Dashboard* - Because different users have different needs within the platform, a customizable user dashboard with an event calendar view and work scope summary is being built. The dashboard will include alarms for urgent and overdue items and list bottle order confirmation needed, recent schedule changes and upcoming sampling or QM&M events on projects the user has been invited to. The dashboard will include customizable audible and visual alarms, mute functions, and customizable views and preferences. You will also be able to click on an event or alarm in the dashboard and go straight to that project or event.

c. *Lab Label Modifications* - A product currently in design is a new bottle label for both "rush" samples and samples with "short hold" times. These labels would be printed automatically in the field at the time of sampling with the SampleServe Field App and mobile printer. "Rush" samples would be determined by the Project Manager and the "Short Hold" time samples would be determined by the analytical parameter. One of the QR codes would go on the lid of the bottle. These labels will easily be visually identified from regular turn around samples. There will also be special labels printed at the time the Digital Chain-of-Custody is generated. These special labels are designed to go on the outside of the cooler and make it clearly identifiable that the coolers contain rush or short hold time samples.

d. *Pounds of "Contaminant" Calculation* - Determining the progress or effectiveness of attenuation or remediation is not always straight forward. Having a calculation of the

total pounds of contamination remaining at a site and then re-calculating that total pounds of contaminant using a consistent method after each sampling event allows for single data point indicator of progress at a site. This single data point doesn't account for every possible variable at a site however, given a consistent calculation method and using consistent data points, it does provide a good guidepost as to attenuation or remediation progress at a site. SampleServe will create an easy user customizable total pounds of contaminant algorithm that will calculate the volumetric pounds of remaining contaminate at a site within established boundaries. This calculation will be recalculated and graphed to determine progress after each sampling event. This feature will be optional.

e. *Soil Boring Logs/Cross-section Development* - SampleServe will either acquire and incorporate into the platform an existing soil boring log building software or build its own soil boring log software from scratch. Either way, this added feature will also be able to turn user selected soil boring logs into customized detailed cross-sections. The user will be able to easily edit cross-sections and then save those cross-sections to be used in the existing platform for data box maps, iso-chemical contour images, and 3-D modeling.

f. *Health and Safety Plan & Tailgate Integration* - Site safety plan reviews and site safety tail gate meetings and documentation are important to conducting work safely at any project. However, these documents are often overlooked, forgotten at the office, or completed in haste without serious contemplation. SampleServe will incorporate Site Safety Plans and tailgate meetings into to the platform and field app and will make them so that a Project Manager can set them as a required part of any scheduled work scope. The Project Manager will be able to set settings so that the HASP must be reviewed by all parties on-site, in its entirety, prior to any work commencing work on a project. The tablet HASP can contain customizable text, photos, and videos. Advanced features in the tailgate meeting safety review, include the automatic addition of site-specific chemical hazards, a review of weather conditions scraped from the local weather forecasts. Specific weather-related hazards in the forecast and appropriate responses can automatically be incorporated into the HASP. Hazards such as thunderstorm, heat stroke potential or frost bite or hypothermia potential.

g. *Hydraulic Conductivity from Low-Flow Sampling Data* - Hydraulic conductivity is a value for which groundwater flow velocity, contaminant dispersion and other nuances at a site are determined. Although complex when done manually, these values can be easily determined using software from already existing collected data using the built in low-flow calculator in the mobile field app. A reliable hydraulic conductivity value can be calculated for each monitoring well every time it is sampled using low-flow methods. These values can be used in fate and transport modeling.

h. *Machine Learning/Fate & Transport Modeling* – The concept of applying machine learning to environmental projects is based on having data from thousands of sites of contamination. That data includes data on the soil types and the organic content of that

soil at depth, the hydraulic conductivity at the site, data on the types, locations, and concentrations of the contamination at the site, and data on the degradation of the contaminate over time. If we have all this data on thousands of sites, and then we get a brand-new site into our portfolio, with machine learning, the software compares the site data from the new site and then makes comparisons and predictions based on the data from the similar sites for those thousands of other sites. The more site data we have in our system, the more accurate our predictions become. We can test this process by taking sites we have substantial historical data on and only entering the first half of the historical data into the machine learning system. We can then test to see how accurate the predictions from the machine learning were by comparing to the know collected data. Being able to predict accurately, quickly, and inexpensively the time to impact a sensitive receptor and what a site will likely look like 2-years, 5-years, or 10-years down the road, allows an owner operator to evaluate potential future risks and liabilities more thoroughly and to make more informed decisions about how to allocate remedial resources across its portfolio of projects.

i. *Site Priority Ranking* – When an owner operator can thoroughly evaluate potential future liabilities, they can then more easily rank sites based on relative risks and consequently, risk reduction priority. If for instance, an operator had 100-sites or projects, and SampleServe has implemented its planned system to rank the relative risk of the sites to one another based on established calculated criteria such as time to impact a sensitive receptor from the machine learning modeling above (drinking water well, indoor air, surface water, etc...). Sites that currently had impact to a receptor would obviously be at the top of the list, sites with no current impact but a predicted impact in the near future, would come next, and so on until the sites with no potential to impact a sensitive receptor would be at the bottom. This site ranking will be automatic and based on a set criterion that is uniformly applied and not subject to bias based on financial motives of any contractors. The re-ranking from highest risk to the lowest would be continuous and updated each time new sample data is collected and uploaded to the platform. Financial resources can then be applied and allocated appropriately across the portfolio.

j. *Site Closure Assessment* - Using the same machine learning system and relative risk ranking system discussed above, sites with no potential to impact a sensitive receptor can be automatically flagged based new data and further evaluated against criteria and barriers to closure. Having a flagging system that evaluates data and requires a response as to why a site in not being closed, when it appears to meet closure criteria, keeps consultants aggressive towards closure and helps prevent projects from languishing in the attenuation monitoring phase longer than needed.