Sanjel ENERGY SERVICES

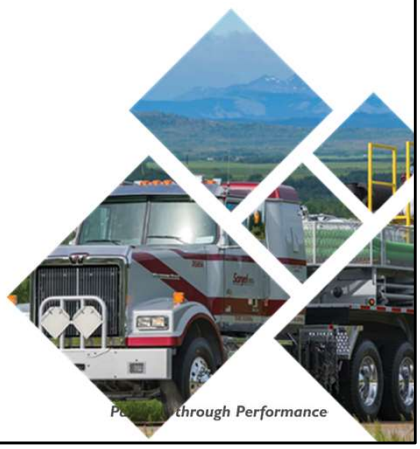
BPAVS

BULK PLANT AUTOMATION & VERIFICATION SYSTEM

Partners through Performance

AGENDA

- Introduction
- Office/Client Application Use
  - Starting the software
  - Finding a blend
  - Processing a blend
- Tablet Use
  - Starting blending
  - Moving through blends
  - Emptying the add-mix
- MTS Generation
- Troubleshooting



INTRODUCTION

- The BPAVS software has been created to standardize the Sanjel blending process
- Utilizing scales on the Add-mix and Blend Train allows us to track each component of a blend
- This software was developed entirely in-house
- It takes a process that has been largely the same for many years and modernizes it.
- The software trials have been running out of GP for most of the last year.

- BPAVS was developed to standardize the blending practices and processes across the company
- Each district has (or is) getting an updated add-mix bottle with scales. Between the add-mix and blend train scales we can track each component of a blend.
- This software was developed in house over the last several years.
- This is the first step in modernizing a process that has been basically unchanged for the last 40 years.
- We should also take a moment to recognize that the software trials have been running in GP for most of the past year. These guys have been using the system and the dealing with all the bumps along the way. Their knowledge, feedback and patience was instrumental in getting us here.

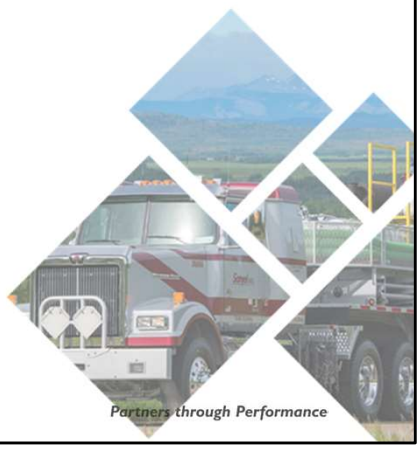
SPEAKING PLAINLY

- This is a large change the current processes that are in place.
- It will take some time to get used to
- In many cases the system may ask you to do something a different way than you have done it in the past or learned through local tribal knowledge.
- Using the software will slow you down at first.
- We have the data to back up just how close the blends are.

- We need to acknowledge that this is a huge change from the current way we do things
- It is going to take some time to get used to doing things this new way
- The system is going to ask you to do things differently than you may have done them in the past.
- Getting used to running BPAVS is going to take a little while and you will be slower through the learning curve.
    - You might look at something and say “my way is quicker”, which could very well be true.
    - I’d ask you to remember that this is all about standardizing the process.
- It will provide data that can be used to showcase just how accurate the blending process is, as well as helping out with troubleshooting job issues.

WHERE IS THIS ALL HEADED

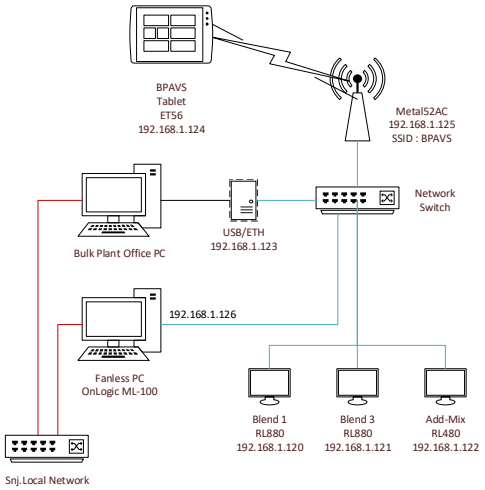
- The BPAVS software is the first step in:
  - Computer assisted MTS generation
  - Blend tracking and storage visibility
  - Auto populated SBS journal entries
  - The automated sampling system
  - Blend Train Automation



- What does this modernization do for us? Having BPAVS in place opens a bunch of doors like:
- Not having to hand write MTS's
- Keeping track of blends and their statuses in the plant + providing visibility on them to the rest of the company
- Automatically populating SBS journal entries
- Allows for further automation of the system, the first step being the automated sampling system
- And ending with a fully automated blend train.

SYSTEM LAYOUT

- The user interacts with the software via the BP office PC + a Rugged Tablet
- The tablet communicates with Wi-Fi to the BPAVS server
- The server collects data from the scales, tablet and Office PC to drive the process



- Just a quick look at how the system is structured. The user only really has to worry about the office PC and the tablet
- The tablet talks to the server through the BPAVS wireless network.
    - There is nothing fun on there, no internet access
- All the data comes together at the server and distributed to the office pc and tablet

SYSTEM CONNECTIVITY

- The entire process relies heavily on being able to communicate with the Sanjel servers
- If the internet/phones are down any active blends can keep going.
  - Dispatch will have to send a blend sheet
- Additional work is being done to increase the network reliability in the bulk plants

- A solid internet connection is required for the BPAVS system to grab data from the Sanjel servers.
- If there is an internet outage and you're already working on a cut the system will carry on
  - If things get really bad, the dispatcher may have to send a blend sheet to your device.
- We are working with IT to see about improving the reliability of the internet in the bulk plants.

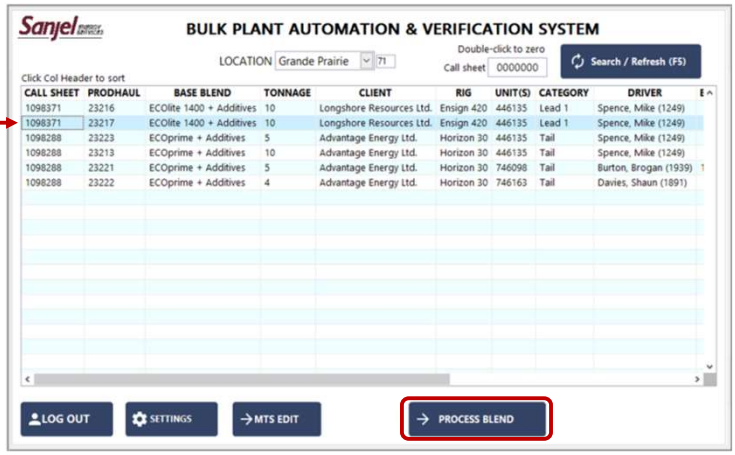
PREPARING TO BLEND

- The BPAVS application will load automatically when a user logs in
  - Also pinned to the taskbar, just in case.
- Log in using your Sanjel username & password

- Okay, we'll start getting into the meat of things. BPAVS will fire up when you log into the Office PC.
  - An icon is also pinned to the taskbar at the bottom if you need to restart it for some reason.
- Just use your standard Sanjel username and password to log in.

PREPARING TO BLEND

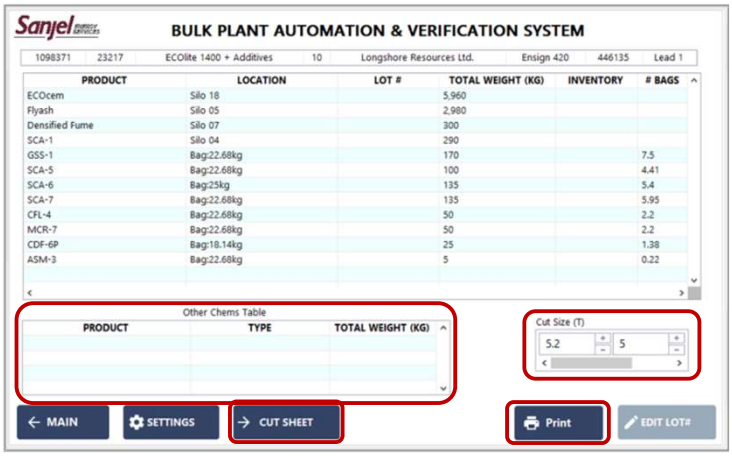
- The first screen allows the user to view available blends for any district
- Use the drop-down to select your district
- Use the Search/Refresh button to reload the list
- Select the desired blend and press Process Blend



- Our first screen is going to show you all the available blends for the selected district.
- Use the drop-down to select the district you're looking for.
- The software doesn't refresh the list automatically, you need to manually refresh it using the Search/Refresh button or pressing F5
- You can also manually enter a call sheet number and press the search/refresh button.
- Click the row for the desired blend and press process blend at the bottom of the screen.

PREPARING TO BLEND

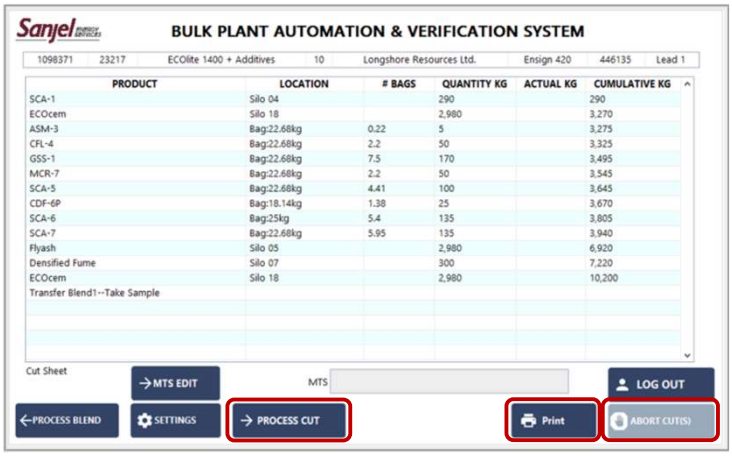
- From here, the user can see all the components in the blend
  - An additional table shows any products that are not blended but required for the job.
- The blend can be split into two cuts
- This list can be printed if desired
- Press the Cut Sheet button to move to the next step



- Now we can see all the components of the blend in the top table
  - You may get an error message at this point about certain chemicals not being set up. We'll go over the message and how to fix it later.
- This smaller table to the bottom left is for other chemicals on the call sheet, but that are not listed as part of the blend.
- The blend can also be split into two cuts
  - Use the +/- buttons to the right of the starting size to adjust the cut size or type in the size you want for cut 1, cut 2 will update automatically
- Here it's been split using the buttons to 5.2 & 5t cuts
- If you'd like a paper copy of this list, you can generate a PDF using the print button in the lower right-hand corner
- When you're ready to move on, press the cut sheet button.

PREPARING TO BLEND

- Here each step of each cut is listed out, this is the order that BPAVS will follow as the blend is processed.
- This list can be printed
- Use the Abort Cut button while processing a cut to start over
- Press Process Cut to move to the next step



- This table lists out each step in the process as determined by BPAVS. I'll touch on the algorithm in the next slide.
    - If there were two cuts set up for the blend, all steps for both cut 1 and cut 2 are displayed.
- As with the blend screen, this list can be printed out if you like, the print button is once again at the bottom right.
- Should something go wrong with a blend and you need to stop or start over, the ABORT CUT button is available when processing a cut.
    - This will be touched on again later, but the important part to remember is that the system WILL NOT remember any of the progress on the current cut.
- Press the Process Cut button to move to the next step and get to blending

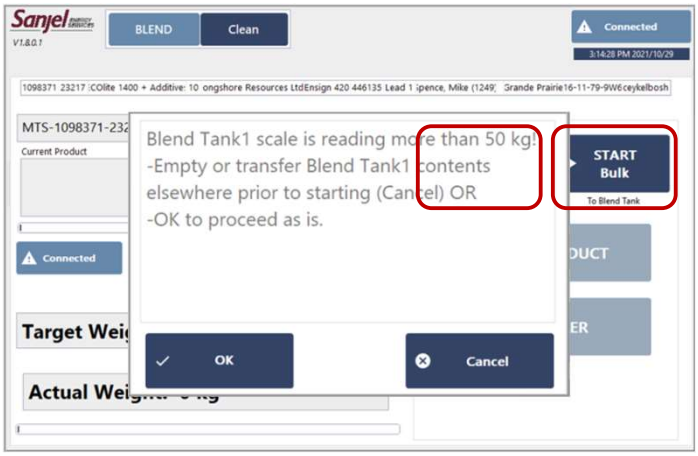
BLENDING – LAYERING ALGORITHM

- BPAVS will determine the order for products to be added at the add-mix
  - There is no way for the user to change the order
- Chemicals have been broken into categories
  - Add first
  - Add last
  - Middle
  - Any
  - Layer
- Contact your manager with any feedback.

- Let me pause here for a second to talk about the layering algorithm.
- BPAVS determines the order of the products that are added and there is no way for the user to change it.
  - This was all developed through field feedback and consultation
  - There are some general rules like spheres or gypsum will always be added first for bulk products, LCC-1 will be layered between the various chemicals, etc.
- For the add-mix stuff the rest of the chemicals have been broken out into categories for them to be processed. They were either set up as
- Add first
- Add last
- Add in the middle
- Add anytime
- Or Layered like I mentioned with LCC-1
- If you have any suggestions on improvements, please reach out to your manager to review them.

BLENDING

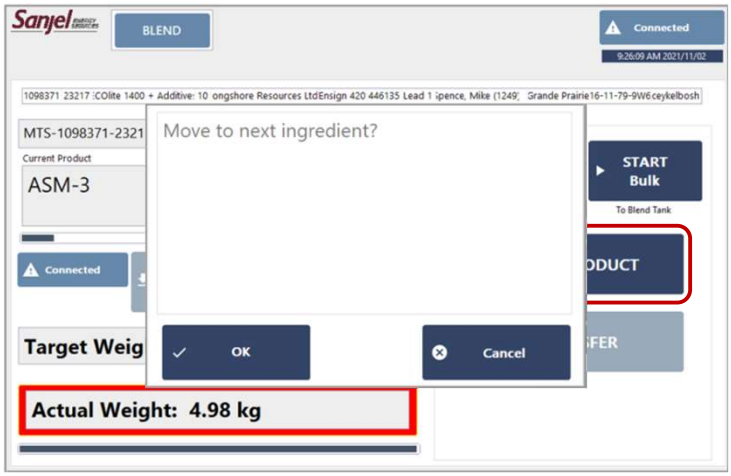
- Blending is carried out from the tablet
  - Everything is also on the office PC.
- The system monitors the weight in BT1 to ensure it is empty before being able to start adding products
- The user has two choices
  - Start bagged – Cut bags first
  - Start bulk – Move bulk product to Blend train 1 first



- The rest of the actual blending process is carried out from the tablet
  - All of the same screens are available on the office PC if something goes wrong with the tablet.
- You may get a pop-up right away warning you that there is already weight in BT1
  - At this time it is up to you to know what is in blend 1 and act accordingly.
- Once that is resolved, there are two options to get going
- Start bagged – cutting bags first
  - A quick note that you can cut bags for one cut while there is a different cut in or transferring out of blend train 1
- Start bulk – start with the bulk/silo products first.

BLENDING – START BAGGED

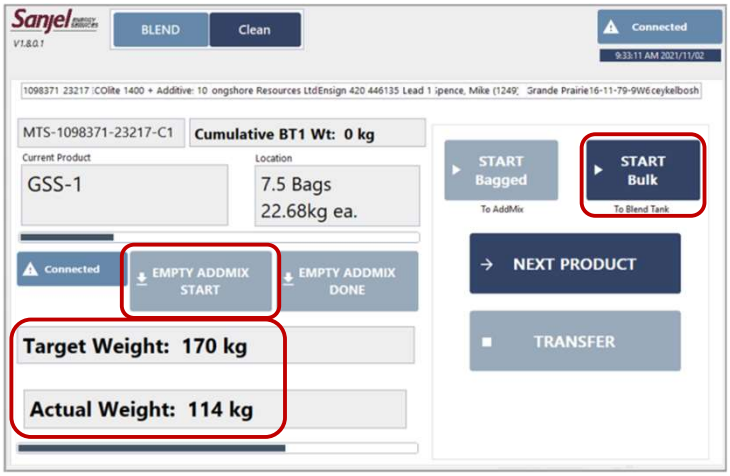
- A confirmation message pops up once you press Start Bagged
- Add the first product to the required weight displayed on the tablet
  - The Actual weight will begin to flash once:
    - Target <50kg, Target – 1kg.
    - Target >50kg, Target -10kg
- When at the required weight, press the Next Product button
- This continues until
  - The add-mix is full
  - All the bagged products are in the add-mix



- The system will throw up a confirmation message once you press start bagged.
- Start adding the specified product to the hopper until the target weight is met.
  - The red box at the bottom will start to flash when you get close to the target
  - It is still a very coarse setup right now, for target weights less than 50kg, you need to be within 1kg for the red to start flashing
  - For targets over 50kg, it will flash once you're within 10kg of the setpoint.
  - This carries through to the bulk products as well
  - All of the tolerance info is being updated or imported to the servers, but it's going to take a little while to sort it all out. For the time being the Blending IDHA should still be your guide for tolerances.
- Once you're on target press the next product button
  - A quick note here – the BPAVS system will automatically tare the add-mix scale display when you press next product.
- The system will pop up a confirmation message.
- Keep going until the add-mix is full (or full enough), or all of the bagged products have been added.

BLENDING – EMPTY ADD-MIX

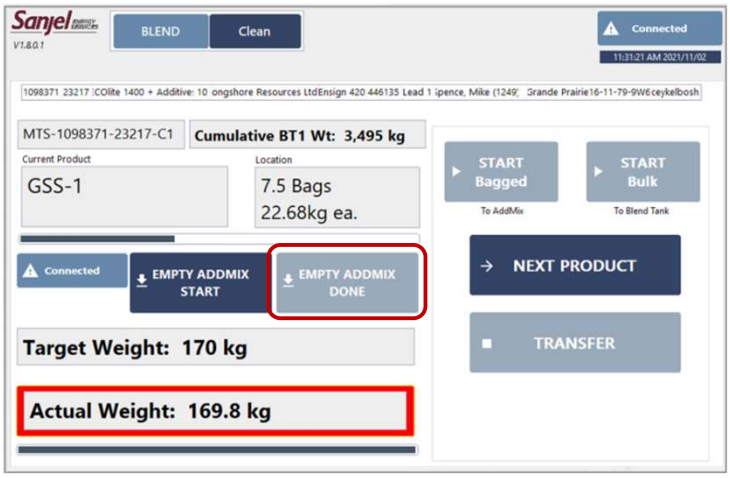
- If the add-mix is full, press Start Bulk to add the bulk products
  - The system will remember the weight of the current product
- If all the add-mix products fit, BPAVS will move straight into the bulk products
- In either case, the system will not enable the empty add-mix function until the first round of bulk products are in BT1



- Once the add-mix is full or you've hit a good stopping point before the end of the bagged product, press start bulk to move to the bulk adds
  - The first round of bulk products need to be in blend train 1 before the system will be able to empty the add-mix
- If you're mid-way through a product don't worry, the system will remember how much you've added and be able to pick right back up after we get the add-mix emptied
- If all the add-mix product fit on the first go, the system will move straight into the bagged products.
- Either way, you won't be able to use the empty add-mix button until the bulk products have been added.

BLENDING – EMPTY ADD-MIX

- Once the first round of products has been moved to BT1, the system transitions back to the add-mix products
- The Empty Add-Mix function is now available
- Press the button BEFORE airing up the add-mix
- Air the add-mix down BEFORE pressing the Empty Add-Mix Done button
- Carry on until finished



- Once the first round of bulk has been added and you press the next product button the system will revert to the add-mix products
    - If you finished all the add-mix products the firs time, the only option will be to empty add-mix
    - If you stopped part way through the empty add-mix button is now available
- You can now use the empty add-mix feature to record that the products are being moved to blend train 1
- This part is important – make sure you start the empty add-mix process before airing up the tank
    - Airing up the tank can cause the load cells to drift slightly, which could throw off the weight for the current add
- After that carry on until you're done or the add-mix needs to be emptied again.
    - Once you're done the last add-mix product, the Next product button won't be available until you've emptied the add-mix

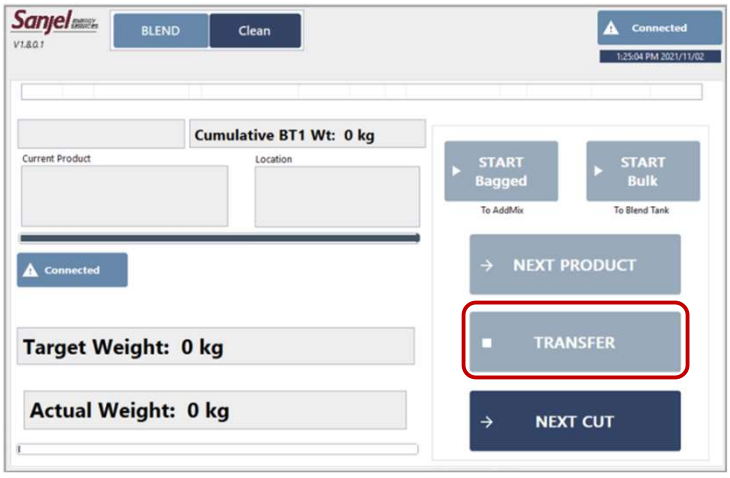
BLENDING – START BULK

- When the PROCESS CUT button is pressed the system will check if BT1 is empty.
- The blending process is very similar to START BAGGED, just starting with the silos
- Once the last bulk product has been added BPAVS will move to the add-mix products.

- You also have the choice of starting with adding your bulk products off the hop.
- The process is very much the same as start bagged
- Once the last bulk product is added the system will move straight to the add-mix products.

BLENDING – COMPLETING A CUT

- Once you reach the last add-mix product, empty the add-mix
- Once emptied the 2nd half of the bulk products will be added
- When adding the final component of the blend, the transfer button is available
  - This can be considered the "DONE" button for the current release
- If this was the first cut of a blend, the NEXT CUT button will appear after the user presses TRANSFER



Partners through Performance

- After the last add-mix product, empty the add-mix one more time.
- Once that process is done, the system will let you move to the next bulk product
- On the last component of the blend, the transfer button is active.
  - For this release of the software, this is the DONE button
  - Down the road the user will be sent to the transfer screen to digitally shuffle the product around the plant.
- If there are multiple cuts to the blend, the NEXT CUT button will show up after pressing the transfer button to allow you to roll right into start bagged or bulk for the next one.

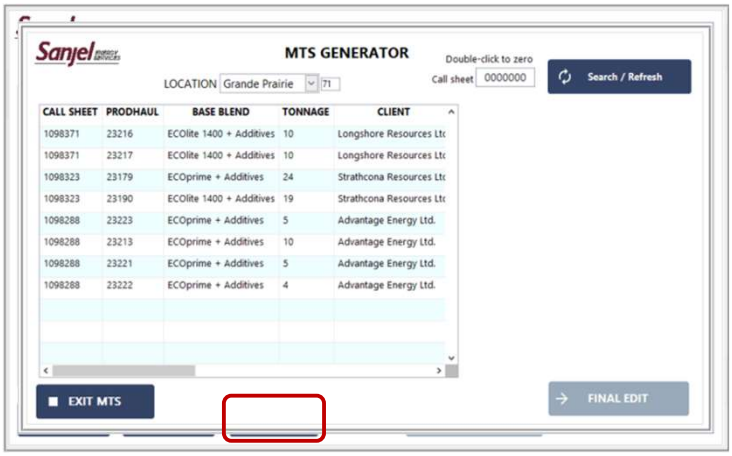
TRANSFER FUNCTION

- V2 is still in development.
- Will provide real-time knowledge of where everything is in the plant

- All the V1 transfer functions in the system have been hidden away while we get V2 running.
    - V1 was a little cumbersome while we were worried about tracking the weight of everything while it moved through the plant
- At the end of the day, having visibility where everything is in the plant will be a requirement in the future.

GENERATING AN MTS

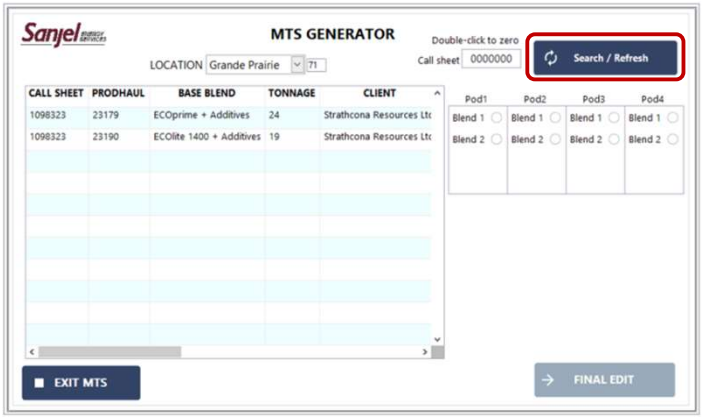
- The MTS EDIT feature is available from both the main and cut screens
- Allows the user to quickly and easily generate an MTS for a load
- An MTS needs to be created for each call sheet being loaded.
  - Multiple blend sheets can be on the same MTS



- The MTS Edit feature can be accessed from the main screen and the cut screen
- It lets you quickly knock out an MTS for a load with no need to bother with writing
- One thing to note is that if there are blends from multiple call sheets being loaded into a single bulker, a unique MTS needs to be done up for each call sheet.
  - No worries about having multiple blends from the same call sheet on there though…

GENERATING AN MTS

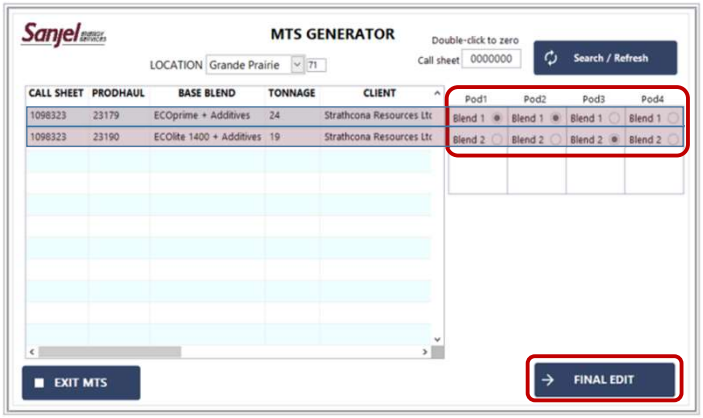
- Select the call sheet for the MTS to be generated
- The system filters out any other blends that are not associated with this call sheet.
- Use the Search/Refresh button to select a different call sheet



- Click on the call sheet that you'd like to make an MTS for
- The system will filter out any of the other call sheets to make this next bit a little easier
- If you want to select a different call sheet, press the search/refresh button in the top right corner

GENERATING AN MTS

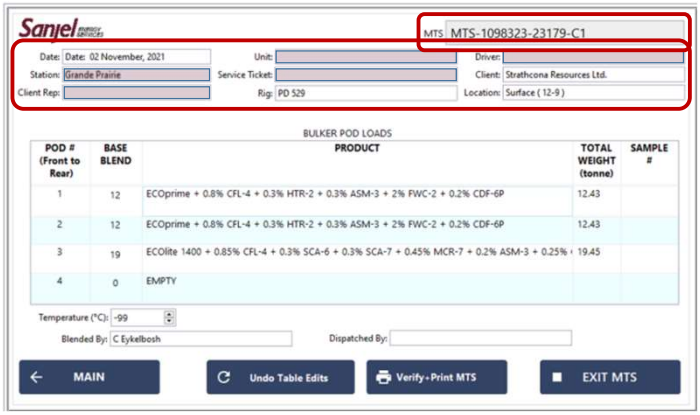
- Use the radio buttons to the right to select which blend is in which bulker pod
  - 23179 is split across pods 1&2
  - 23190 is in pod 3
- Press the FINAL EDIT button to move to the next screen



- Now that you have your call sheet select you can go about telling the system what blend is in what pod or pods.

GENERATING AN MTS

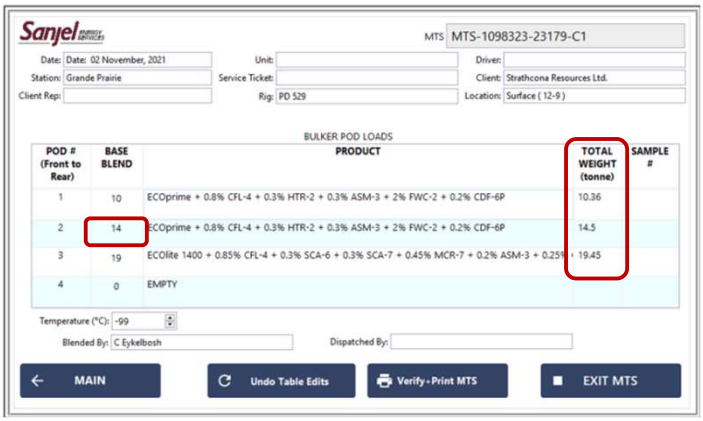
- The header information is imported from the call sheet
- The MTS number is system generated and cannot be changed
- Some of the other fields can be edited if needed
  - Station
  - Client Rep
  - Unit #
  - Service Ticket
  - Driver



- The header info is populated from the selected call sheet
- BPAVS cobbles together an MTS number based on the call sheet and first selected blend sheet.
  - The file that is generated has further date stamp information to make sure it is unique
- Some of these fields can be edited if needed
- Station
- Client Representative
- The Unit #
- A Service Ticket Number can be added
- And the Driver can be changed

GENERATING AN MTS

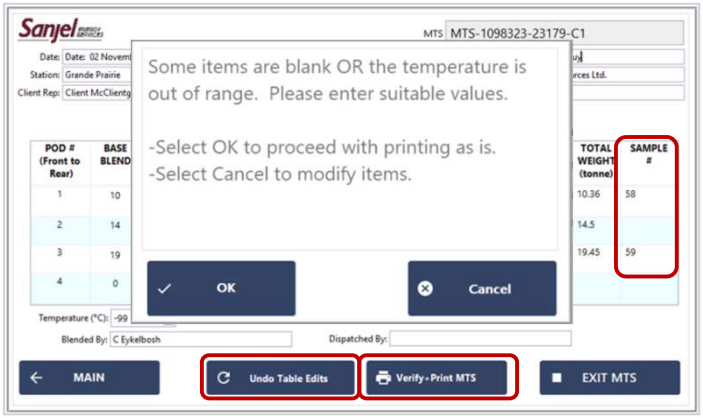
- The system splits a blend loaded into multiple pods evenly
  - 24t has been split into 12/12 in pods 1&2
- The Base Blend weight for each pod can be edited
  - Changing the weight in pod 1 will not update pod 2
  - Pod 1 is changed to 10t, the user also needs to edit pod 2 to 14t
- The total weight for each product is updated based on the base blend weight
  - It cannot be manually edited



- If you selected the same blend in multiple pods on the previous screen, BPAVS will split the weight evenly over however many pods you selected.
  - Here the base blend weight was 24t and has been split evenly across pods 1 & 2
- If you like you can edit the base blend weight for each pod,
- But beware that if you change the weight for one pod, the other won't automatically change itself
- After changing pod 1 to 10t, I need to manually update pod 2 to 14t
- The total weight for each pod is automatically calculated from that pods base blend weight
  - This number cannot be changed by the user.

GENERATING AN MTS

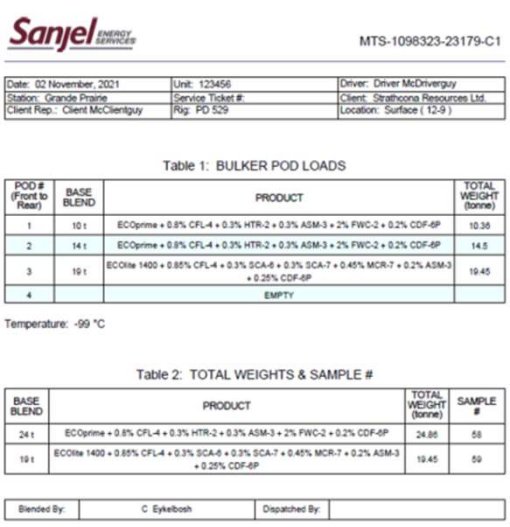
- Sample numbers for the blend(s) can be entered
- The UNDO TABLE EDITS button will reset the entire form back to its defaults
- Press VERIFY+PRINT MTS when all edits are done
- The system will warn the user if anything is blank/out of range.



- There is space at the end of each row for a sample number to be entered for the blend
- Press the undo table edits button if you would like to reset the form, just know that everything including the header will be reset
- Once you have things the way you want them, press the verify & print mts button
- If the system sees anything that is blank or out of range it will pop a message to warn you. Just press okay to carry on.

GENERATING AN MTS

- A PDF of the final MTS is generated and displayed on the screen
  - Also saved to C:\PDF Prints
- Print away!
- Edits to the MTS form are not saved.



Sanjel ENERGY SERVICES

MTS-1098323-23179-C1

Date: 02 November, 2021	Unit: 123456	Driver: Driver McDriverguy
Station: Grande Prairie	Service Ticket #:	Client: Strathcona Resources Ltd.
Client Rep.: Client McClientguy	Rig: PD 529	Location: Surface (12-9)

Table 1: BULKER POD LOADS

POD # (Front to Rear)	BASE BLEND	PRODUCT	TOTAL WEIGHT (tonne)
1	10 t	ECOprime + 0.8% CFL-4 + 0.3% HTR-2 + 0.3% ASM-3 + 2% FWC-2 + 0.2% CDF-6P	10.36
2	14 t	ECOprime + 0.8% CFL-4 + 0.3% HTR-2 + 0.3% ASM-3 + 2% FWC-2 + 0.2% CDF-6P	14.5
3	19 t	ECOlite 1400 + 0.85% CFL-4 + 0.3% SCA-6 + 0.3% SCA-7 + 0.45% MCR-7 + 0.2% ASM-3 + 0.25% CDF-6P	19.45
4		EMPTY	

Temperature: -99 °C

Table 2: TOTAL WEIGHTS & SAMPLE #

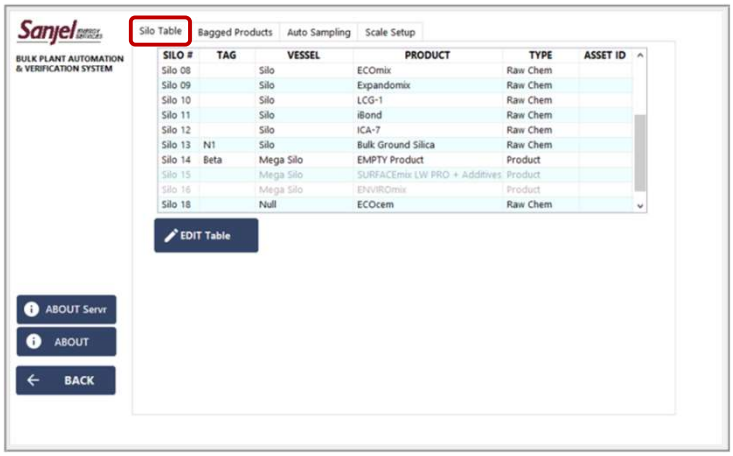
BASE BLEND	PRODUCT	TOTAL WEIGHT (tonne)	SAMPLE #
24 t	ECOprime + 0.8% CFL-4 + 0.3% HTR-2 + 0.3% ASM-3 + 2% FWC-2 + 0.2% CDF-6P	24.86	58
19 t	ECOlite 1400 + 0.85% CFL-4 + 0.3% SCA-6 + 0.3% SCA-7 + 0.45% MCR-7 + 0.2% ASM-3 + 0.25% CDF-6P	19.45	59

Blended By:	C. Eykelbosh	Dispatched By:	

- The system will generate the PDF and bring it up on the screen
  - These files are saved to c:\PDF Prints
- From here you can print it out or do whatever you need to
- Just a note that edits you make to in the previous screen are not saved, if you need to make another MTS for the same load or loads you would need to change the header or disposition stuff again.

SETTINGS – SILO TABLE

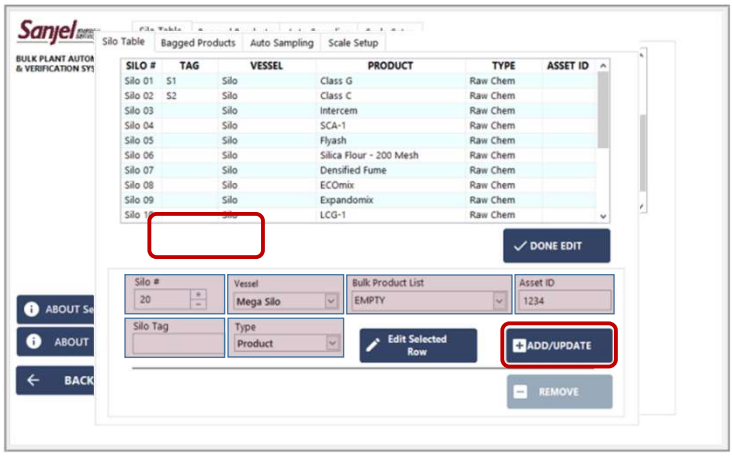
- BPAVS splits silos into two main categories
  - Raw Chem – materials used to create a blend
  - Product –used for onsite storage.
- Keeping this information accurate is important
- Press the SETTINGS button on to access the settings screen
- Select the SILO TABLE



- A little introduction into how BPAVS looks at silos, there are two types
- Raw chem silos are for the bulk products used to make a blend, these are places that BPAVS can draw from
- Product silos like P-tanks or mega's are used for storage of finished blends
- Keeping this information accurate is important
  - Someone will work with each camp to make sure their plant is properly configured
- To get at the silo table, press the settings button and then
- Select the silo table tab at the top of the screen.

SETTINGS – ADDING A SILO

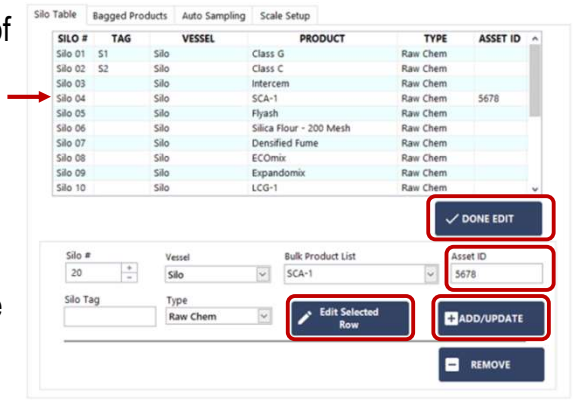
- Press Edit table
- Adjust the parameters as needed
  - Silo Number
  - Silo Tag
  - Vessel
  - Type
  - Bulk product (if needed)
  - Asset ID (Important)
- Press the Add/Update button to save the new Silo



- Once at the settings screen, press the Edit table button to get going.
- Here we're going to set up a new product storage silo to house finished blends, to do this we set
- The silo number
  - It picks the next number from the list (which is 20) automatically
- The silo tag
  - This can be something more specific to your site, would be displayed anywhere that "Silo 20" would show up.
- The vessel type, here I've selected it as a mega
- This type was covered off in the last slide, seeing as we want to store finished blends in this silo, it would be set to product
- If the silo was being set up as a raw chem type, this would be where the user would select what chemical is in there.
- Press the add/update button to save the new silo to the list.

SETTINGS – EDITING A SILO

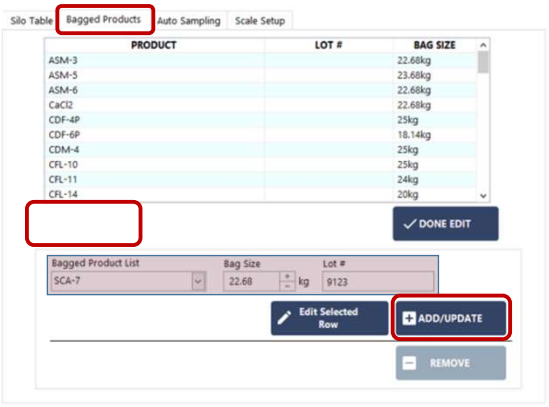
- You can also edit the contents/type of silo
- Click on the row of the silo you wish to edit
- Press the Edit Selected Row button
- Make the required changes
- Press the Add/Update button to save the changes
- When done with adding/changing silos, press the DONE EDIT button



- Silo contents or type are going to change on occasion.
- If you would like to edit the contents of a silo, click its row in the table up top to select it
- Press the edit selected row button below the table
- Make any changes you need to and
- Press the Add/Update button to save your changes.
    - Here I 5678 was added as the new asset number
- When done adding or changing silos, give the DONE EDIT button a press to lock your changes in and be able to return to the main screen

SETTINGS – BAGGED PRODUCT TABLE

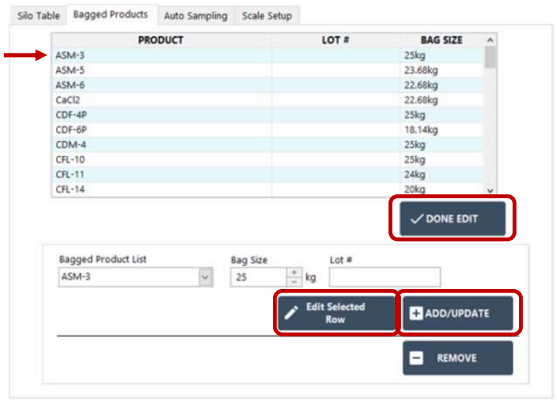
- This process is very similar to adding/changing a silo
- Go to the Bagged Products tab on the settings screen
- Press the Edit table button
- Enter the details of the new product
- Press the ADD/UPDATE button



- This is very similar to adding or changing a silo
- In this case you would select the bagged product tab from the settings screen.
- Hit the edit table button to unlock things.
- Here we'll quickly add a new product – SCA-7
    - Use the dropdown to find the chemical you're adding
    - Set the bag size
    - There is a space for a lot number if you wish, but not essential at this point.
- Hit the add/update button when things are ready to go
    - At this point if you were done, you would hit the DONE EDIT button and exit the settings screen.

SETTINGS – BAGGED PRODUCT TABLE

- To edit a current product, select the row
- Press EDIT SELECTED ROW
- Make the changes
- Press ADD/UPDATE
- When done press DONE EDIT



- Editing a product is also super easy, click the row you would like to edit
- Press the edit selected row button
- Make your change, here I've changed the bag size from 22.68kg to 25kg.
- Hit the add/update button to save the change
- Press the done edit button when you're all wrapped up to lock in the changes and exit the settings screen.

TROUBLESHOOTING

- Added too much/little
  - < Target – should never happen
  - > Target – by how much? Are you still within the IDHA tolerances? Escalate if necessary
- Added the wrong product
  - Just out of order? – print the cut sheet, manually mark up the situation and carry on.
  - Wrong Altogether? – full stop, escalate, potentially scrap it
- Missed a button press
  - Treat as out of order.
- Chem not in table
  - Add to the table and retry
- Abort cut
  - All progress is lost, it will not remember what has been added the next time you try to blend it.

- We've come up with a few different situations you may run into while using the software
- Adding too much or too little of a product
  - Adding too little to the point where you are out of tolerance should never happen
  - If you add too much, how much are you over? Is it still within the tolerance listed in the blending IDHA?
  - If you are outside of tolerance you need to escalate to manager before proceeding
- Adding the wrong product, there are two likely scenarios here
  - The first being that you added a correct product, but out of order.
  - Head to office and print out the cut sheet. Mark it up as you go to give yourself a paper trail for later.
  - If you've added the wrong product all together it's a full stop situation, escalate to your manager.
- Missed a button press, like forgetting to press next product.
  - Treat this the same way you would adding the right product but out of order, document what is happening and move on.
- You may get a pop-up on the blend screen that a chemical is not defined.
  - Use the instructions in the previous slides to add it to the silo or bagged product table and try again.

- If you need to abort the cut, remember that the system is not going to remember what had already been added during this cut when you restart, that data is gone.

WRAPPING UP

- It's always a good idea to have a paper trail
- It's even better if you send a quick note to your manager about what went down
- Chances are whatever happened will show up on a report if things are off
- Remember – this software was built in-house
  - We want your feedback
  - We are here to support you
    - Charlie Eykelbosh – 403-464-0484, give me a shout if you need anything.
- Thanks!