

LABORATORY PROCEDURE

STP-2.1, COMBUSTION RETARDING EFFECTIVENESS

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References:

STP 2 Combustion Retarding Effectiveness (Burn Test)
REVISED BURN TESTING – Alternate Evaluation using only 2 GPC coverage levels (2019)
Evaluation of Forest Fire Retardants-A Test of Chemicals on Laboratory Fires (1962).
LF-2.1.0 Burn Test Sprayer and Residue Spreadsheet
LF-2.1.1 Burn Test 10.6% DAP Mix Sheet
LF-2.1.2 Burn Test New Product Mix Sheet-Dry
LF-2.1.3 Burn Test New Product Mix Sheet-Wet
LF-2.1.4 Fuel Bed Conditioning and Spraying Sheet
LF-2.1.5 Burn Bed Data Benchsheet (old version), new version is imbedded in the full data sheet, LF-2.1.8
LF-2.1.6 and LF-2.1.7 are both calculators to determine if salt requirements are met in accordance with the specification.
LF-2.1.8 Burn Test Data Worksheet
MA-160 Method Justification (2016)
Burn Chamber Controls Walk Thru (2018)

1. Abstract

1.1. This procedure outlines the entire combustion retarding effectiveness testing process, referred to hereafter as the *Burn Test*. All instruction is for WFCS laboratory personnel and is based upon Standard Test Procedure (STP) 2, Combustion Retarding Effectiveness.

2. Overview

- 2.1. Wildland Fire Chemical Systems performs combustion retarding effectiveness testing on all Long-term retardants. This test evaluates the chemical after it has been conditioned to dry in an environmental chamber so it is not applicable to class A foams or water enhancers. The acceptance limits of this procedure are provided by the comparable performance of the 10.6% (w/w) diammonium phosphate (DAP) standard solution.
- 2.2. The wind tunnel and combustion chamber of the Missoula Fire Science Lab is used to conduct all testing. Two different fuel types are evaluated. Pine needles are evaluated as the waxy, resinous fuel and aspen excelsior is used as the fine woody cellulose fuel. The developmental product is applied at one coverage level of 2 gallons per 100 sqft (GPC). 2 GPC is also used for the DAP standard to a second bed for direct comparison of performance. Finally, an untreated bed is prepared to evaluate flame spread and weight loss across the untreated fuels. Both the developmental product and DAP are analyzed in the wind tunnel at set conditions of 5 miles per hour, 90°F, and 20%RH. The rate of spread and weight loss are recorded for each burn as a part of data collection. This data is then used to directly compare performance with reduction in weight loss and reduction in rate of spread from the baseline of untreated fuel.
- 2.3. Historically Wildland Fire Chemicals evaluated a second coverage level at 1 GPC, but the findings of: 2019 REVISED BURN TESTING – Alternate Evaluation

using only 2 GPC coverage levels, demonstrated a modification to only 2 GPC was an accepted reduction in scope. This improved reproducibility of the test and reduced expenses. This testing was first developed in 1962 using the work of Hardy, Rothmel, and Davis with the Intermountain Forest and Range Experiment Station (1962).

- 2.4. The data collected are averaged using a minimum of 5 burns on each fuel type. Developmental product burns are directly compared to DAP burns from the same day to reduce variables in wind tunnel conditions. A spreadsheet is used to compile all data and then a letter is sent to the company informing them of how their product performed.
- 2.5. All long-term retardants are evaluated using this test and must either meet the minimum salt concentration or the acceptable performance outlined in this test procedure.
- 2.6. Spot checks of alternative formulations may also be conducted using this testing. A minimum of 2 replicates on each fuel type are used to confirm performance. Additional replicates may be needed if non-conforming results are observed. All testing is at the expense of the submitter.

3. Procedure

This procedure is outlined chronologically for each task performed. Some sections may be performed in an alternative order or concurrently for efficiency. Scheduling of the combustion chamber and wind tunnel should be done approximately 1 year in advance. Ideally shoulder seasons are used for scheduling, avoiding months where outdoor temperatures are below 35°F, which is found to be the lowest temperature the wind tunnel can operate and hold conditions of 20%RH and 90°F. Due to reduced available space in the combustion chamber, operations have been reduced to preparation and burning of approximately 4 beds each day. A typical burn day would consist of:

- 1 Fuel type
 - 1 untreated bed
 - 1 DAP bed
 - 2 replicates of developmental products

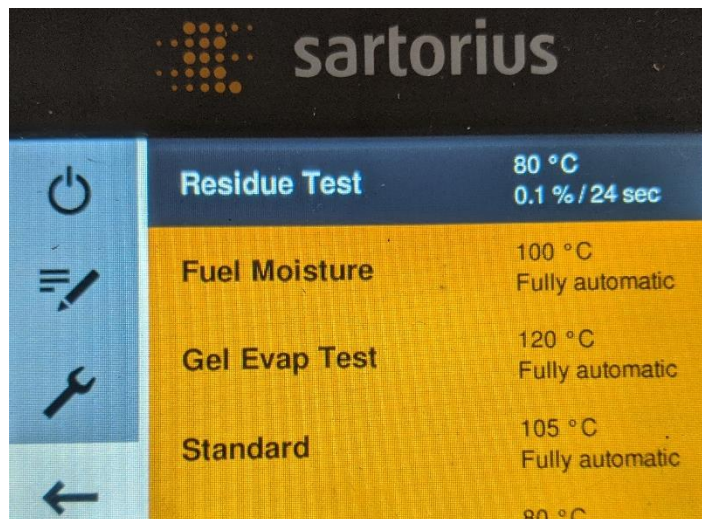
BE SURE to wear all appropriate Personal Protection Equipment as deemed necessary by the task being performed (i.e. gloves, goggles, ear protection, nomex, etc.)

Prior to requiring a burn test, products may be deemed acceptable (without burn testing) based on the underlying salt content. The lab forms LF-2.1.6 and LF-2.1.7 can be used to determine if burn testing can be waived. Some salts do not have the historical data to waive testing, so for new, non-validated salt formulations a burn test will be required. Refer to the specification for guidance.

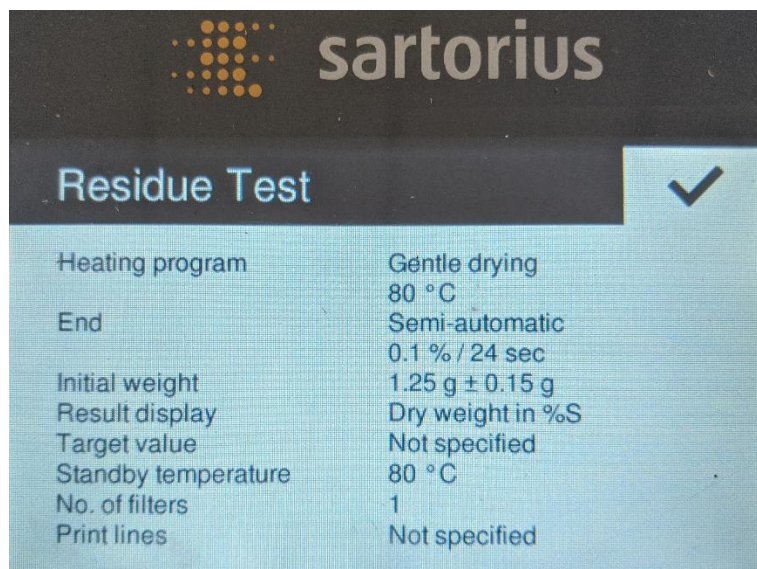
3.1. RESIDUE DETERMINATION

Prior to time in the combustion chamber developmental products and DAP are mixed for use. Samples are collected to submit for chemical analysis and the rest is transferred to carboys for transportation. A separate sample is collected to perform % solids residue testing. This is done to determine the expected water content that should be evaporated to be within drying tolerances.

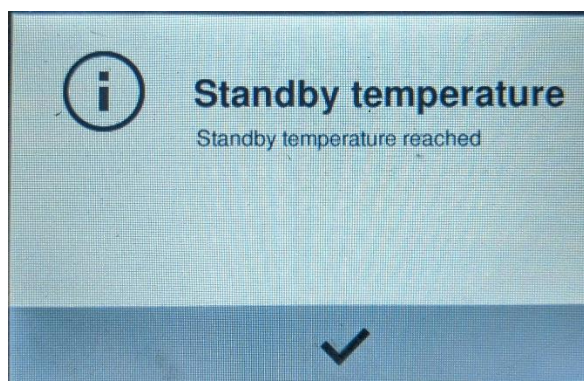
- 3.1.1. Use the current version of Lab Form (LF) LF-2.1.0 to record all data. The “residue” tab is needed for this section. Prior to any testing, you will need to use the DMA 35 density meter to determine the density of the solution. Record each density in g/mL on the LF. There are also directions embedded in the LF to help explain use of the form.
- 3.1.2. Power on the MA-160 Moisture Analyzer. Locate the calibration sticker and verify it is within its calibration date.
- 3.1.3. Navigate the home panel and use the touch screen to select the method Residue Test as shown.



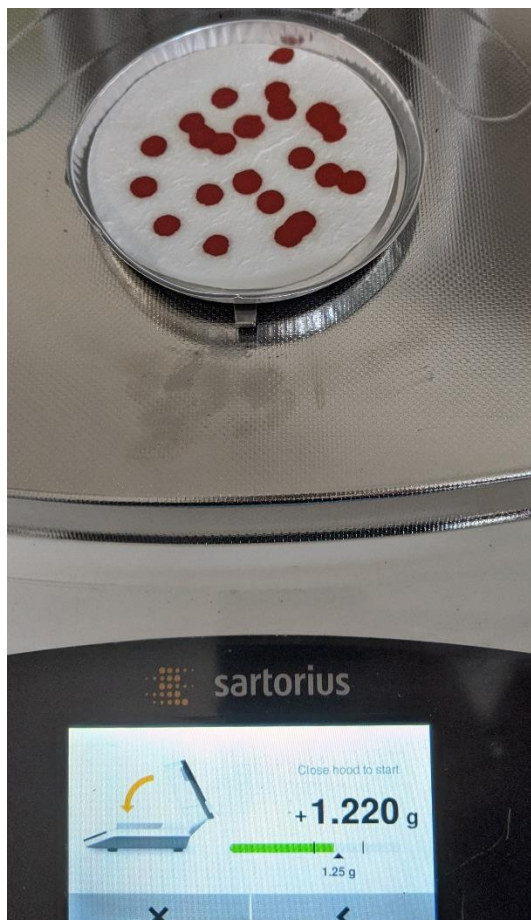
- 3.1.4. This program uses the following settings to analyze the sample. These settings should not be changed unless properly validated. Wildland Fire Chemicals validated use of this method through the work documented in *MA-160 Method Justification (2016)*. Previously the method used an oven-drying approach that was labor intensive and had a higher standard deviation in measurement.



- 3.1.5. Once selected, press the START button in the lower right-hand corner of the touch screen. This method utilizes a Standby temperature, so it is best practice to wait until the screen designates that you may proceed.



- 3.1.6. If you are analyzing the first sample of the day, you will want to use an independent calibration verification (ICV) as a daily check. Typically this is a 10% (w/w) solution of sodium chloride, but any standard salt solution is acceptable.
- 3.1.7. Open the hood and follow the on screen instructions. When applying the chemical to the filter paper, attempt to apply it evenly across the surface to assure the most uniform drying. See the photo below for reference.



- 3.1.8. When the screen shows that the applied amount is correct, the data bar will turn green. Follow the on screen directions and close the hood. You will note that the program starts as soon as the hood is closed and a real-time graph appears on the screen.



- 3.1.9. The program runs until it has completed. It uses criteria of less than 0.1% change over 24 seconds to determine constant weight and calculate results in % solid.



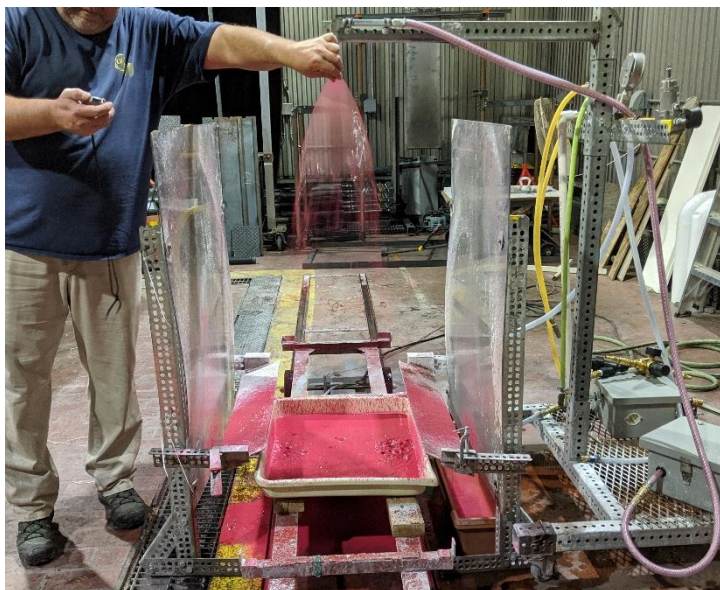
- 3.1.10. Record the % solid measurement in LF-2.1.0 and remove the old sample. Repeat the process for all replicates and products needed. Typically 5 replicates are used to determine the residue, but 3 may be acceptable if the Relative standard deviation (%RSD) is below 5.0%. The average % solid measurement is used later in the process, so make sure to save the file in a known location. If analyzing more than 2 different products, several copies of LF-2.1.0 can be saved in the appropriate file.
- 3.1.11. When you are completed with the measurements for the day, power down the MA-160.

3.2. SPRAYER CALIBRATION

- 3.2.1. This step in the process can be either completed prior to entering the chamber or prior to applying the first coverage level to a fuel bed. Each product requires a 3 point calibration to account for different flow characteristics.
- 3.2.2. Required items for this section:
- Density measurements for each of the test products, and the mixed product
 - Sprayer and cart or tray
 - Balance capable of weighing entire fuel bed
 - Stop watch
 - Different T-jet tips (8010, 8020, 8030, etc.)
 - Splash guards and PPE
 - Calibration tray
- 3.2.3. If not already completed from [Section 3.1.1.](#), enter the densities of each of the products into LF-2.1.0. Then assure these densities appear correctly within the *Sprayer Calibration* tab. Then take the calibration tray and place it on the test balance, tare the balance.
- 3.2.4. Setup the spray apparatus, prime the pump with water and assure it is operating optimally before introducing mixed products. It is useful to introduce air pockets into the suction line to remove any in-line bubbles. It is useful to setup the splash guards at this time as well to protect equipment and clothing.
- 3.2.5. Once all air bubbles have been removed, move the suction line into a well-mixed test product container. Repeat the introduction of air bubbles as needed for the mixed product to remove any new air bubbles. Attach a T-jet tip (historical data suggest using the T-jet 8030 for the DAP standard) to test out the sprayer pattern.

- 3.2.6. Inspect the sprayer during operation and assure uniformity of the pattern across the width of the bed. Try out different T-jet tips as needed to get the most uniform pattern applied.

Figure 1- Sprayer Calibration Setup



- 3.2.7. Once the spray pattern appears uniform, setup the sprayer, cart, and calibration tray as shown in Figure 1. Assure that the fuel bed can properly move through the setup with the rails guarded by the splash guard.
- 3.2.8. With the tared calibration tray on the cart, use the stop watch to record application times. With the pump on, but the spray nozzle closed, simultaneously fully open the spray nozzle and start the stop watch. Stop both at the same time after approximately 10 seconds. Move the calibration tray to the balance and record the weight and time into LF-2.1.0 under the “*Sprayer Calibration*” tab and the correct product. Tare the calibration tray once again and repeat the process using an approximate 20 second interval. Record the new weight in the same lab form and repeat a third time at either a higher or lower time interval as deemed necessary.
- 3.2.9. Once a minimum of 3 times have been recorded in the lab form, review the associated equation for the linear fit curve. If the R^2 value is greater than 0.995 no additional times are needed, otherwise repeat a fourth and fifth replicate to determine if a better fit can be calculated or if an outlier was recorded. Once the R^2 value is greater than 0.995, update the green boxes *Equation*, *m*, and *b* fields to reflect the new equation.

NOTE: These green boxes are used by the lab form to calculate the specific times for 2 GPC coverage levels of each product. These calculations are then used in the *Bed Weight Calculator* tab for when products are applied.

3.2.10. This calibration will be retained in the form and saved for timing purposes of programming the controller.

3.3. CHAMBER CONTROLS

3.3.1. The chamber is controlled using a software interface developed by Johnson Controls. The details of this operation are outlined in *Burn Chamber Controls Walk Thru* (2018). This document references login information, set points, safety, and overall operations. A copy of this is also located in Appendix C.

Computer Login	
<u>Password:</u>	Fire1234!

Metasys Login	
<u>Username:</u>	Facilities
<u>Password:</u>	Bms1234!

Experimental Login	
<u>Username:</u>	Experiment
<u>Password:</u>	Burn1234!

<u>Network IP:</u>	192.168.56.18
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3.4. FUEL CONDITIONING AND BED PREPARATION

3.4.1. Time scheduled within the burn chamber vary according to other research and products, but whenever possible it is helpful to move the fuels into the chamber the weekend before use. By breaking apart a bale of excelsior and removing pine needles from their boxed containers, the open air flow helps get the fuels to a constant moisture content more quickly.



NOTE 1: There are two different ways to operate the chamber, OPEN LOOP and CLOSED LOOP. In the mornings, during conditioning, the CLOSED LOOP setting is used to recycle the conditioned air rather than pull in outside air. This is discussed in the *Burn Chamber Controls Walk Thru* from the CHAMBER CONTROLS section.

NOTE 2: Do NOT operate OPEN LOOP when outdoor conditions are below 35°F.

NOTE 3: If space in the burn chamber is unavailable, it can be helpful to store fuels in the back lab the weekend before moving into the chamber to help reduce acclimation time to the indoor conditions.

3.4.2. Taking a fuel moisture content reading discussed in [Section 3.7](#). Can help assure that the fuels are ready for preparation. When time is critical, “wet” beds can be prepared by filling fuel buckets toward the upper end of the weight limits.

3.4.3. After a weekend of conditioning, the fuels should be ready for weighing and bed building. Fuel beds are 8 feet long and 1.5 feet wide with a guard rail that measures approximately 3-4 inches high to help contain the fuel. The ends of each burn bed remain open (no guard rail). LF-2.1.8 includes a *Building Worksheet* tab that can be printed for recording data in the burn chamber. This printed form is used to record the empty weight of each bed and the day and time of the reading. Beds have assigned numbers on each end of the bed for traceability. These numbers and fuel types are also recorded on the lab form.

3.4.3.1. Excelsior bed building uses 4.0 lbs of fuel for each bed. Four buckets are used, with a target weight of 460 grams each to account for loss during preparation.



3.4.3.2. It is best practice to layer the bed using 2 pounds (or buckets) first to make sure the fuel is uniform, distributing the fuel evenly from side to side and end to end. Then the remaining 2 buckets are used to finish the bed with the second layer directly on top and integrated into the first layer. Using your fingers, loosen and shake the fuel to provide a uniform fuel bed. Finally, hedge trimmers are used to trim the fuel around the edges and along the top for consistency.

- 3.4.3.3. Starter beds are prepared the same way using a different weight of fuel per bucket. Starter beds are used to provide a natural introduction of the flame to the fuel burn bed.
- 3.4.3.4. Pine needle bed building uses a target weight of 6.0 pounds of fuel in the same dimension beds as described above. This uses 6 buckets with the target weight of 460 grams per bucket.
- 3.4.3.5. For pine needle beds it is best to start with 3 buckets and uniformly distribute the fuel from side to side and end to end. Then the remaining 3 buckets are distributed on top of the first layer. Again, use your fingers to loosen and shake the fuel so that it can better lay flat and integrate the two layers.
- 3.4.3.6. Lastly the trimmers are used to remove and trim layers that are out of the fuel bed dimensions.
- 3.4.3.7. As with the excelsior beds, starter beds for the pine needles are also prepared using the same starter bed dimensions but with a fuel bucket weight to match the fuel loading of excelsior.
- 3.4.4. After each fuel bed is prepared, a final weight and time is recorded on LF-2.1.8 and the bed is set aside to condition in the chamber. Weights are taken periodically to confirm that a constant weight has been achieved prior to applying chemicals to each bed. This same printed form is used to record the applied product weights in the next section.

3.5. CHEMICAL APPLICATION

- 3.5.1. Developmental products and the standard 10.6% DAP chemical are applied using the calibrated sprayer from earlier sections. This section uses LF-2.1.8 and LF-2.1.0.
- 3.5.2. After fuel beds have been prepared and reached a constant weight this section is to be completed. Note that not all fuel beds will have a chemical applied; 1 each of the pine needles and excelsior fuels will be untreated to provide the test with a “blank” or untreated measurement.
- 3.5.3. Setup of the spray apparatus is discussed in [Section 3.2](#). Prior to chemical application on a conditioned fuel bed, you will need to do a couple of things:
 - Refer to LF-2.1.0 for calibration times and T-jet nozzles that are appropriate for each chemical
 - Assure the pump is primed and all air is removed from within the suction line
- 3.5.4. Place one of the untreated (conditioned) beds onto the spray cart. Next, using a stop watch, turn on the controller and use the stop watch to time how long it takes for the bed to entirely run under the spray apparatus. Use

a reference point such as the tip of the sprayer or the end of the splash guard. Use this reference time to make adjustments to the controller.

- 3.5.5. Using the LF-2.1.0 under the *Bed Weight Calculator* tab you will see a drop down menu that allows for the selection of which chemical you are applying and the coverage level as shown in the figure below.

Figure 2- Bed Weight Calculator, Product Selection

Product	Target GPC	density
10.6% DAP	2	1.064
Add (grams)		
minimum (grams)	target (grams)	maximum (grams)
942	967	991

- 3.5.6. The lab form will update the density from the *Residue* tab which the data was collected from instruction of [section 3.1](#). If this section was not yet completed, stop here and complete that section first.

- 3.5.7. Once the drop down menus are selected, data fills the worksheet and provides estimated target times to use. These are referencing the *Sprayer Calibration* tab. Again, assure that section is completed before this section.

Figure 3-Bed Weight Calculator, Target time

Low weight	High weight	Low time	Target time	High time
942	991	27.17	27.86	28.55

- 3.5.8. After the initial run (as completed in [Section 3.5.4](#)), you will likely need to adjust the controller to either speed up or slow down the cart. As seen in Figure 3, the target time is the mid-range time that should be used to apply the target of 2 gallons per 100 square feet (2 GPC). To be on the safe side it is best practice to adjust the controlled to just below this target time to guard against an overspray which requires rebuilding a new bed for application.
- 3.5.9. The controller currently uses an analog dial setting (Figure 4), where the higher the number the faster the motor. So as this dial is turned “up” the cart moves faster which reduces the time it takes for the cart to run beneath the sprayer. This can be a point of confusion when optimizing the controller to match the target time (or a little bit faster than the target time) to prevent an overspray. If in doubt after making adjustments to the controller, use the stop watch to time the cart.

Figure 4-Motor Controller

3.5.10. Once the timing of the cart closely matches the target time (or slightly faster) you can begin the application.

3.5.11. Prior to application a dry or untreated weight of the bed is taken and recorded on LF-2.1.8. and entered into the electronic LF-2.1.0 under the *Bed weight calculator* tab in the field called “Pre-Spray Bed weight” as shown in Figure 5.

Figure 5-Bed Weight Calculator, Pre-Spray weight

BED SPRAY CALCULATOR				
RED = TOO MUCH *DAMNIT		GREEN = GOOD SPRAY		BLUE = ADD MORE
Bed ID		Data	Product	Target GPC
10	Pre-Spray Bed weight	18531	10.6% DAP	2
	Weight after Spray	0	Add (grams)	
		-18531	minimum (grams)	target (grams)
	2nd Spray		19473	19498
	Pre-Spray Bed weight	18531		
	Weight after Spray			
		-18531	Add (grams)	target (grams)

3.5.12. When this is all setup and looks good, start the first application under the sprayer. First start the cart and as it approaches, turn the spray nozzle on before the cart has reached the application area. Once the cart has entirely cleared the spray area, turn off the spray nozzle and turn off the cart motor controller. Take the bed to the balance and take a “Weight after Spray” reading and enter it into LF-2.1.0.

3.5.13. The weight applied will appear below in either a color blue, green, or red indicating what needs to be done next. Figure 6 shows when the application is within the weight tolerances (green text and fill). Application tolerances are 1.95 GPC – 2.05 GPC.

Figure 6-Bed Weight Calculator, Applied chemical weight

BED SPRAY CALCULATOR					
RED = TOO MUCH *DAMNIT		GREEN = GOOD SPRAY		BLUE = ADD MORE	
Bed ID		Data	Product	Target GPC	density
10	Pre-Spray Bed weight	18531	10.6% DAP	2	1.064
	Weight after Spray	19498	Add (grams)		
		967	minimum (grams)	target (grams)	maximum (grams)
2nd Spray			-25	0	24

3.5.14. If the chemical was over weight (too much added) the only way to correct this is to prepare a new fuel bed. Often times this is done by using the “untreated” bed and then building a new untreated bed later to replace it. All data should be recorded on the associated lab forms.

3.5.15. If the chemical was under weight (designated by a blue text and fill), then the cart will need to run under the sprayer again to apply more product. Figure 7 shows that when an under spray happens, how much more weight is needed to meet tolerances, and the minimum calibration time.

Figure 7-Bed Weight Calculator, Under-weight

BED SPRAY CALCULATOR					
RED = TOO MUCH *DAMNIT		GREEN = GOOD SPRAY		BLUE = ADD MORE	
Bed ID		Data	Product	Target GPC	density
10	Pre-Spray Bed weight	18531	10.6% DAP	2	1.064
	Weight after Spray	19398	Add (grams)		
		867	minimum (grams)	target (grams)	maximum (grams)
2nd Spray			75	100	124
Pre-Spray Bed weight		18531			
					Low weight
					942
					minimum time needed (sec)
					2.17

3.5.16. When underweight applications occur, you will have to reprogram the controller to meet that time or manually run the cart below the sprayer at a constant speed. After a reapplication, weigh the bed a final time to assure you are within the tolerances. There is a “2nd Spray” field that appears below the first application to account for this weight change.

3.5.17. Beds should appear uniform in appearance after application. Repeat this section for each product being tested, being sure to change T-jet tips, flush the chemical, and reset the controller to match the associated calibrations for each chemical. All products are compared to DAP and untreated on both fuel types. All fuel beds are allowed to dry overnight and will be burned the following day once they have reached a minimum of 95% dry (as calculated within the lab forms).



3.6. WIND TUNNEL SETUP – The wind tunnel has several different tables, a test scale, burn coil, bed holder, 8 foot marker, and ash bin.

3.6.1. Setup all components and use a 4 foot level to make sure all stands and tables are level. Some connections are made below the wind tunnel floor so, be sure to lower the lift during these attachments and assure all safety practices are followed.

3.6.2. After the burn bed holder is placed on the scale, make sure to tare the scale and make all connections to your computer for communication to the LabVIEW program. When everything is setup and a bed is set on the stand it should appear as shown in Figure 8.

Figure 8-Wind Tunnel Setup

3.6.3. The wind tunnel is now ready for burning.

3.7. FUEL MOISTURE CONTENT AND BURN BED SETUP – After beds have been allowed to dry overnight, they are likely ready to be burned in the wind tunnel.

3.7.1. Fill in the data collected from previous sections into LF-2.1.8. The form will auto-calculate the % dry weights to reference and check prior to burning. If the weights meet the percent dry tolerance, record the chamber weight on the LF-2.1.8 printed form and load the bed (and same fuel starter bed) up onto the wind tunnel lift.

3.7.2. Once in the wind tunnel place the burn bed on the bed stand and move the tables around the bed. Record the weight from the tunnel scale to assure it is similar to that recorded in the burn chamber. Sometimes the fuel bed can be touching one of the side or end tables and lead to an artificially high or low reading. When it looks good, you can then incorporate some of the starter bed to touch and integrate the fuel into the burn bed and take a small sample of fuel from the end of the burn bed (at the 8 foot mark). Place the fuel in the fuel canister and exit the wind tunnel.

3.7.3. Use the MA-160 to measure the fuel moisture. Navigate the touch screen to the programmed tests. Select the “Fuel Moisture” cycle and follow the on screen prompts to set up the tray and sample the material.



Residue Test	
	80 °C 0.1 % / 24 sec
Fuel Moisture	100 °C Fully automatic
Gel Evap Test	120 °C Fully automatic
Standard	105 °C Fully automatic
Daily Check	80 °C

3.7.4. The FMC method was developed using the same temperature conditions as the previous oven drying method (100°C). The stability of the analysis is determined by the program (fully automatic end-point). A 0.5 g sample weight is used due to the size of the instrument.

3.7.5. The MA-160 instrument will beep when the sample measurement is complete. Record the fuel moisture content on the printed LF-2.1.8. and in the electronic form. Fuel moisture for both fuel types should be below 10%, however there are no set tolerances prior to burning.

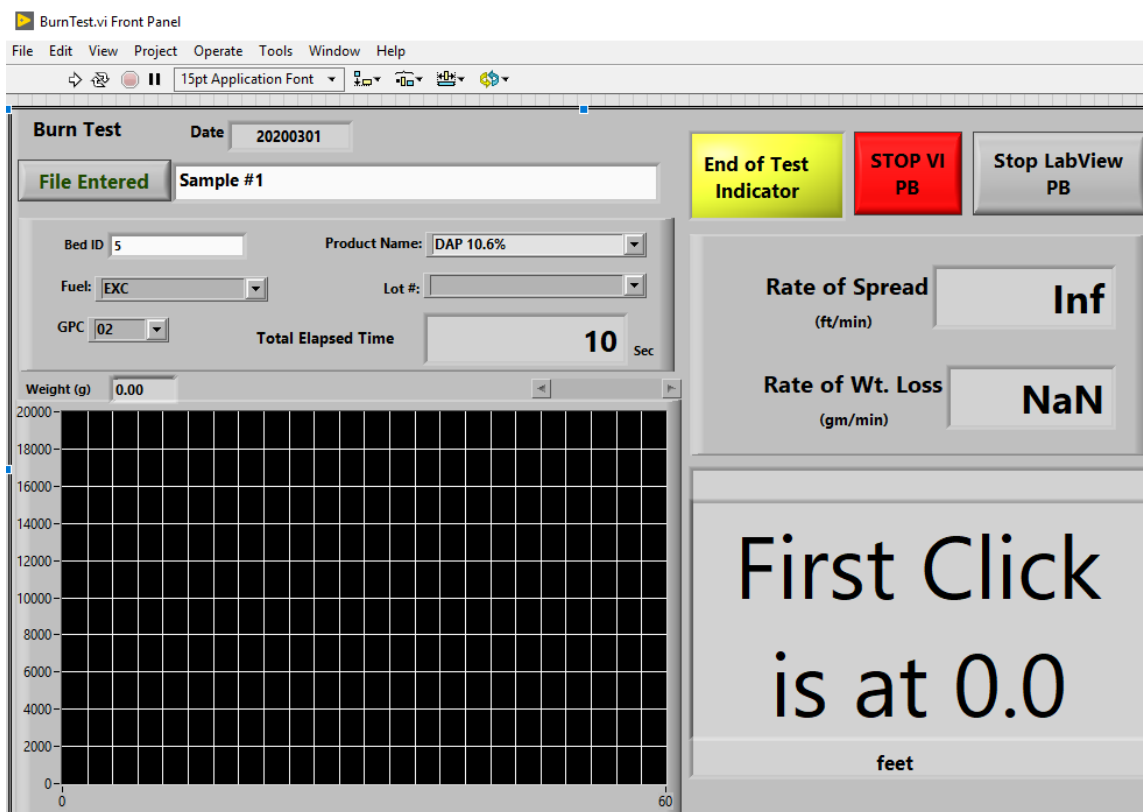
3.8. BURN TEST PROGRAM – LabVIEW is used to record each separate burn to measure rate of spread and weight loss. It is important to check the communication of the scale and LabVIEW using NI-Max prior to running any tests.

3.8.1. Startup whichever laptop is being used for the data collection and make all USB connections needed. One connection is to the test scale (RS-232, COM 3 or 4) and one connection is for the Burn Test clicker (NI USB-6008).

3.8.2. If all communications appear correct, open the BurnTest.vi program on the computer. Depending on which copy you use, the file paths may require update to properly save all the data.

3.8.2.1. If the communications do not appear correct, troubleshoot, and as necessary contact www.ni.com. Historically there have been issues with driver updates and software upgrades with the NI-Serial downloads. Consult a user manual as necessary. Appendix D also has a list of previously conducted troubleshooting approaches.

Figure 9-LabVIEW BurnTest.vi



3.8.3. The program should be tested prior to any real burns. This can be done by entering "Sample #1" (or any suitable name) into the file name field and filling the other fields arbitrarily to confirm data collection. Press the check mark and press the run arrow at the top of the software. A pop-up box will prompt that you fill the file name field with a unique name and click the **File Entered** toggle button imbedded in the software. This will begin the burn test recording. Since it is a test, you can just click through using the burn test clicker as fast as you like until the 8.0 foot mark is displayed in the lower right hand corner. Then press and hold the *Stop VI PB* button until it designates a completed run. This is displayed by an update to the Rate of Spread and Weight Loss fields. You will want to confirm that the raw data was stored to the two locations (one on the flash drive and one on the C drive of the computer). Locations of these files may vary depending on which computer is used. Once confirmed that the data is saved you are ready for an actual test.

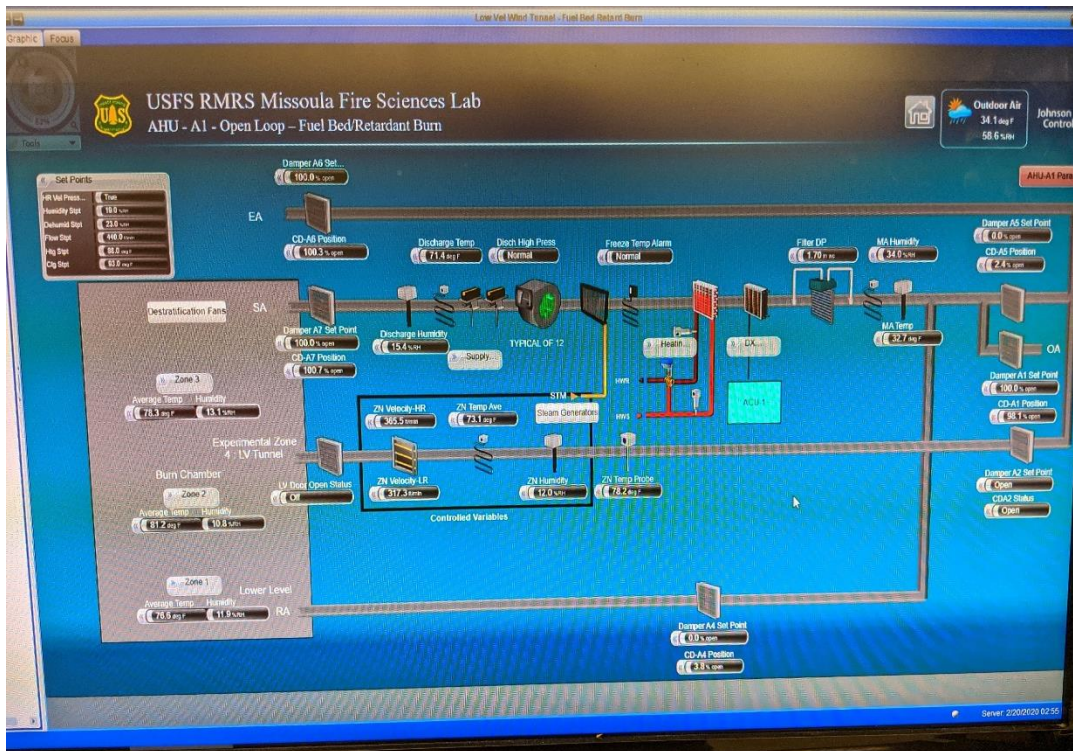
3.9. BURN TEST DATA COLLECTION

3.9.1. Approximately 1 to 2 hours before burning, you will need to switch the burn chamber controls from closed loop to an open loop. This is done easily by removing any overrides from the Open Loop – Fuel Bed/Retardant Burn test cycle. Overrides can be identified with a pale orange outline next to any

of the dampers or other controls. All overrides shall be removed and time allowed for the system to optimize and equalize to the conditions of:

- 5 mph wind (or 440 ft/sec, ± 40 ft/sec)
- $90^{\circ}\text{F} \pm 5^{\circ}\text{F}$
- $20\%\text{RH} \pm 2\%\text{RH}$

For more detailed instructions, refer to the Burn Chamber Controls Walk thru guide or refer to Appendix C.



- 3.9.2. You are waiting until the black outline with the designation of *Controlled Variables* to be within these tolerances.
- 3.9.3. Once all conditions have been met, you can start the burn test program (after entering all associated data into the fields), and ignite the starter bed. Ignition of the starter bed is done with the heating coil that has a two button controller. Press down both buttons until ignition is clear across the width of the coil.
- 3.9.4. Use the burn test clicker and walk perpendicular to the line of sight of the flame front. Press the clicker every time it moves to the next 0.5 ft mark. The first click is at the 0.0 foot mark which correlates to the start of the burn bed (treated or untreated). Proceed to click through as the flame front progresses, keeping an eye on where the flame front meets the fuel and not necessarily the tip of the flame. Once you have proceeded through to the 8.0 marker, end the test and record the data.

3.10. DATA MANAGEMENT – Electronic and hard copies of each of the burns are retained and stored in the associated product folders. The electronic copies are retained in the Burn Test file repository.

3.10.1. When working with LF-2.1.8. It is important that data is correctly tabulated for each of the experimental products. Within the spreadsheet there are *Untreated* and *DAP* “Summary” tabs which are referenced to pull the comparable data from.

3.10.2. Each day that products are burned, an untreated and 10.6% DAP treated bed must also be burned on the identical fuel type. When completing the lab form, you will need to double check that the formulas are selecting the same dates that the products were burned to remain consistent. The calculated values of the reduction index rely on accurate data and calculations from the summary pages.

Figure 10-Burn Test Product Summary

	Excelsior				Needles			
	2 GPC				2 GPC			
	Date	GPC	R/S	R/W/L	Date	GPC	R/S	R/W/L
Product A	2/26/20	2.03	0.998	189	2/26/20	2.00	2.243	256
	2/26/20	2.03	1.412	245	2/26/20	1.98	2.202	236
Average		2.03	1.21	217.00		1.99	2.22	246
% Reduction			87%	67%		*	53%	46%
Reduction Index (Exc) =				Reduction Index (P.Pine) =				
0.77				0.50				
Reduction Index =				0.63				

DAP 10.6%	2/26/20	1.98	1.116	171	2/26/20	1.98	3.582	294
Average		1.98	1.12	171.00		1.98	3.58	294
% Reduction			88%	74%			24%	36%
Reduction Index (Exc) =				Reduction Index (P.Pine) =				
0.81				0.30				
Reduction Index =				0.55				

Untreated	2/26/20	0.00	9.231	660	2/26/20	0.00	4.706	459
Average			9.231	660.000			4.706	459.000

3.10.3. Figure 10 shows that each of the *Untreated* and *10.6% DAP* burns were conducted on the same days as each of the product burns. This is an easy example since all burns were from the same day, but when multiple days

are used, it is important to confirm the correct dates and data are being tabulated.

- 3.10.4. Once the values and equations have been confirmed correct and complete, proceed to the section about report generation, [Section 3.11](#).

3.11. REPORT GENERATION

When all previous steps are done, the report is ready to be completed.

- 3.11.1. An example report is generated as shown in Appendix B. The language of the letter can be adjusted to meet the intent of the work.
- 3.11.2. The data can be copied directly from LF-2.1.8 and pasted as a picture into the summary letter. It is important to only issue results relevant to the company and not to include any experimental burns from other competing companies in the summary letter.
- 3.11.3. Once final, print and review the summary letter. Using peer-review, have a second party sign using a wet signature and date to authenticate the review. Then scan the signed copy and issue the scanned copy as a peer-reviewed report to the company.

4. CALCULATIONS

Calculations used in LF-2.1.8 are explained in this section. Simple arithmetic equations such as weight loss and conversions are not included.

4.1. GALLONS PER 100 SQUARE FEET (GPC)

- 4.1.1. $1 \text{ GPC} = 1 \text{ gallon of product} \div 100 \text{ sqft}$. It is important to note that the density of the product needs to be taken into account when performing these calculations. Density is typically recorded in grams/mL and needs to be converted to gallons to determine proper weights and weight ranges of use.

4.2. RATE OF SPREAD

- 4.2.1. This is calculated between the 3 foot and 7 foot markers unless noted otherwise.

$$\text{Rate of Spread (feet/minute)} = \frac{4 \text{ feet}}{\text{time (in minutes between the 3' and 7' markers)}}$$

This calculation is imbedded in the LabVIEW software but can be calculated manually from the raw data.

4.3. RATE OF WEIGHT LOSS

- 4.3.1. Measurement in grams; this is calculated between the 3 foot and 7 foot markers unless noted otherwise.

$$\text{Weight Loss (grams/minute)} = \frac{\text{(total weight loss (between 3' and 7' markers))}}{\text{time (in minutes between the 3' and 7' markers)}}$$

This calculation is imbedded in the LabVIEW software but can be calculated manually from the raw data.

4.4. REDUCTION INDEX

4.4.1. The reduction index (RI) is used to compare the performance of the experimental product to that of an untreated fuel bed of the same fuel type.

$$R.I. (excelsior, pine needles) = \left(\frac{\text{Average Rate of Spread of Untreated} - \text{Average Rate of Spread for the 2 GPC product}}{\text{Average Rate of Spread of Untreated}} \right)$$

The calculation for each fuel type is conducted separately and the RI of the product is then averaged for both fuel types and compared to the average RI of 10.6% DAP. For a product to pass the test, the following shall be true:

$$RI_{\text{product}} > RI_{10.6\% \text{ DAP}}$$

5. Training

5.1. Training is provided and supervised by a qualified analyst.

APPENDIX A – BURN TEST PROCUREMENT PAPERWORK

Procurement of burn test supplies are not limited to but are as follows:

1. Aspen Excelsior, ordered through American Excelsior

PROCUREMENT REQUEST INSTRUCTIONS: Agencies must provide entries in unshaded areas. See reverse.			TO: (Procurement Office)					1. REQUESTING OFFICE WFCS			
2 RECEIVING OFFICE NO.	3 CONTRACT NUMBER (If Applicable)	4 ORDER DATE	5	6 UNIT CODE	7 FUND CODE	8 PURCHASE/DELIVERY ORDER NUMBER	9 SUB.	1A. PROCUREMENT REQUEST NO.			
				13	TX			1B. DATE 12/11/2017			
CHECK ONE ☐ Purchase Order ☐ Delivery Order		10. TO: (Seller) American Excelsior Attn: Marvin Price/Anne Sanks 831 Pioneer Ave Rice Lake, WI 54868 801-391-7314				11. SHIP TO: (Consignee and Destination) Bill Yount WFCS/MTDC 5785 Highway 10 West Missoula, MT 59808 ☐ INSIDE DELIVERY REQUESTED					
12 LINE ITEM	13 ACT. CODE	14 DESCRIPTION				15 BUDGET OBJECT	16 ACC. LINE	17 QUANTITY	18 UNIT ISSUE	19 UNIT PRICE	20 AMOUNT
1		Standard Excelsior #932 Spurlax. 9 bales/pallet						18 bales		\$37.52	\$675.36

2. Pine needles (slash pine) can be ordered through PineStraw.com

PROCUREMENT REQUEST INSTRUCTIONS: Agencies must provide entries in unshaded areas. See reverse.			TO: (Procurement Office)					1. REQUESTING OFFICE WFCS			
2 RECEIVING OFFICE NO.	3 CONTRACT NUMBER (If Applicable)	4 ORDER DATE	5	6 UNIT CODE	7 FUND CODE	8 PURCHASE/DELIVERY ORDER NUMBER	9 SUB.	1A. PROCUREMENT REQUEST NO.			
				13	TX			1B. DATE 10/15/2019			
CHECK ONE ☐ Purchase Order ☐ Delivery Order		10. TO: (Seller) USA Pinestraw Atlanta, GA 1-800-394-1550				11. SHIP TO: (Consignee and Destination) Greg McBride WFCS/MTDC 5785 Highway 10 West Missoula, MT 59808 ☐ INSIDE DELIVERY REQUESTED					
12 LINE ITEM	13 ACT. CODE	14 DESCRIPTION				15 BUDGET OBJECT	16 ACC. LINE	17 QUANTITY	18 UNIT ISSUE	19 UNIT PRICE	20 AMOUNT
1		240 sq feet premium Pine Straw, 9 inch. (Slash Pine)						1	BX	\$134.99	\$134.99
		240 sq feet premium Pine Straw, 14 inch. (Long-leaf)						2	BX	\$134.99	\$134.99
		https://usapinestraw.com/shop?olsPage=products%2F14-inch-premium-pine-needles-240-sqft-box									

3. Diammonium Phosphate neat chemical is ordered through Fisher Scientific in 500 g bottles.

PROCUREMENT REQUEST INSTRUCTIONS: Agencies must provide entries in unshaded areas. See reverse.		TO: (Procurement Office)						1. REQUESTING OFFICE WFCS			
2 RECEIVING OFFICE NO.	3 CONTRACT NUMBER (If Applicable)	4 ORDER DATE	5	6 UNIT CODE	7 FUND CODE	8 PURCHASE/DELIVERY ORDER NUMBER	9 SUB.	1A. PROCUREMENT REQUEST NO.			
				13	TX			1B. DATE 09/14/2018			
CHECK ONE ☐ Purchase Order ☐ Delivery Order		10. TO: (Seller) GSA				11. SHIP TO: (Consignee and Destination) Hunter Jones WFCS/MTDC 5785 Highway 10 West Missoula, MT 59808					
						☐ INSIDE DELIVERY REQUESTED					
12 LINE ITEM	13 ACT. CODE	14 DESCRIPTION				15 BUDGET OBJECT	16 ACC. LINE	17 QUANTITY	18 UNIT ISSUE	19 UNIT PRICE	20 AMOUNT
1		Ammonium Phosphate, dibasic CAS#7783-28-0. From Fisher scientific.						48	500g	\$39.90	\$1,915.20

4. 5 gallon carboys, may also be needed for storage and transport of the chemical.

PROCUREMENT REQUEST INSTRUCTIONS: Agencies must provide entries in unshaded areas. See reverse.		TO: (Procurement Office)						1. REQUESTING OFFICE WFCS			
2 RECEIVING OFFICE NO.	3 CONTRACT NUMBER (If Applicable)	4 ORDER DATE	5	6 UNIT CODE	7 FUND CODE	8 PURCHASE/DELIVERY ORDER NUMBER	9 SUB.	1A. PROCUREMENT REQUEST NO.			
				13	TX			1B. DATE 01/28/2019			
CHECK ONE ☐ Purchase Order ☐ Delivery Order		10. TO: (Seller) Fisher Scientific (GSA contract pricing) 1-800-766-7000				11. SHIP TO: (Consignee and Destination) **Bill Yount WFCS/MTDC 5785 Highway 10 West Missoula, MT 59808					
						☐ INSIDE DELIVERY REQUESTED					
12 LINE ITEM	13 ACT. CODE	14 DESCRIPTION				15 BUDGET OBJECT	16 ACC. LINE	17 QUANTITY	18 UNIT ISSUE	19 UNIT PRICE	20 AMOUNT
1		Carboys, Nalgene, 5 1/4 gals. (20L) 02-961A						6 Cases	4 per box	\$240.56	\$1443.36

File Code: 5162
Date: April 26, 2016

COMPANY CONTACT
 INFORMATION

Dear POC,

The burn test on your long-term fire retardant, Product A (formulation identification # BCDEF), has been completed in accordance with US Forest Service Specification 5100-304c and the results are summarized in the attached tables. This testing was conducted at ### lbs/gallon and compared to the standard 10.6% Diammonium Phosphate (DAP).

Each product treatment is matched with a treatment of standard chemical (10.6-percent diammonium phosphate or DAP) of the same amount on the same fuel. These test beds are then burned on the same day along with an untreated bed of the same fuel. The two different fuel types used are Aspen Excelsior and Ponderosa Pine needles.

To be acceptable, each product must have a reduction index (RI) equal to or greater than the reduction index for DAP based on the same burn days. That data and the final results are summarized in the table below and on the following data sheets.

Lot Number, Concentration	Product RI	DAP RI	Result
Product A	0.63	0.60	Acceptable

If you have any questions related to this work, please contact our program

Sincerely,

Hunter Jones

HUNTER JONES
 Project Leader - Chemist
 Wildland Fire Chemical Systems
 406-829-6810
hunter.jones@usda.gov

CC: S. Zylstra

Fall 2018								
Summary of Data and Analysis Product A 1.00 lb/gal								
	Excelsior				Needles			
	2 GPC				2 GPC			
	Date	GPC	R/S	R/WL	Date	GPC	R/S	R/WL
Product A 1.00 lb/gallon	10/22/18	2.00	1.667	366	10/22/18	2.02	1.348	222
	10/22/18	2.04	1.967	352	10/22/18	2.04	0.945	195
	10/24/18	2.05	2.087	390	10/24/18	2.06	0.892	162
	10/24/18	2.06	3.04	494	10/24/18	2.05	1.043	193
	10/25/18	2.04	1.88	305	11/4/18	1.99	1.765	221
Average		2.04	2.13	381.40		2.03	1.20	198.60
% Reduction			69%	40%			77%	60%
Reduction Index (Exc) = 0.55					Reduction Index (P.Pine) = 0.68			
Reduction Index = 0.61								
DAP 10.6%	10/22/18	1.95	1.702	166	10/22/18	2.04	2.791	264
	10/24/18	1.98	1.905	328	10/24/18	2.02	2.963	244
	10/25/18	1.96	2.124	329	11/4/18	1.99	4.364	338
Average		1.96	1.91	274.33		2.02	2.88	254.00
% Reduction			72%	57%			44%	49%
Reduction Index (Exc) = 0.65					Reduction Index (P.Pine) = 0.46			
Reduction Index = 0.55								
Untreated	10/22/18	0.00	6.667	680	10/22/18	0.00	4.800	473
	10/24/18	0.00	8.000	588	10/24/18	0.00	5.455	524
	10/25/18	0.00	6.000	636	11/4/18	0.00	4.528	475
Average			6.889	634.667			5.128	498.500
Maximum		2.06	3.038	494		2.06	1.765	222
Minimum		2.00	1.667	305		1.99	0.892	162
Std Dev		0.02	0.532	70		0.03	0.363	25

APPENDIX C – Burn Chamber Controls Walk Thru

Computer Login Password: Fire1234!

Look for LAUNCHER program from desktop; use localhost

Program Login: Experiment
Burn1234!

Computer Login	
<u>Password:</u>	Fire1234!
Metasys Login	
<u>Username:</u>	Facilities
<u>Password:</u>	Bms1234!
Experimental Login	
<u>Username:</u>	Experiment
<u>Password:</u>	Burn1234!
Network IP: 192.168.56.18	

ALWAYS select ACK for alarm status

For ease of operation, we only utilize one program at a time. This also helps the system which logs data to help with its performance over time. When switching between programs, this “learned” performance is erased and the system has to re-learn how to operate optimally.

We use the Retardant Open Loop Program:

1. When opening the program, you first have to *enable* the program, this is on the left-side of the software controller.
2. Once enabled, you can toggle the program to *ON*.
3. By double-clicking the program button/title, it will open the operational flow diagram with instrument readings and graphics.
4. From here there are a list of set points on the upper left of the program. These let you set high and low control points that the system uses to respond and set fan outputs, etc.

We use the following set points upon startup:

Humidity Low Control	16% RH
Humidity High Control	20% RH
Wind Speed	440 ft/min
Temperature Low Control	85°F
Temperature High Control	90°F

You will note, these control set points tend toward the lower end of the desired setpoints (i.e. 20%RH, 90°F) and this is because the system operates in a manner that favors these higher end values. If we used 87.5 – 92.5 for the temperature, we would find the average would tend towards 92°F. The system best operates with a 5°F range and a 2-3%RH range. Decreasing ranges below this results in the system “fighting itself” to achieve the proper conditions.

5. When making changes to these set points, you must press the *enter* button otherwise the value will not be saved to memory. Also, be sure not to cross the setpoints (i.e. setting the high point below the low).
6. It will take the system about 30 mins to an hour to ramp to operating conditions when using the open loop program.

To change conditions to CLOSE LOOP for overnight/conditioning purposes, perform the following:

1. OPTIONAL, lower the wind speed a little to decrease the pressure build up in the system. 2 mph or **176 ft/min is suggested. This is also the lowest speed that should be used overnight**, lower speeds can result in issues with the cooling coils.
2. Override the A5 Damper by right clicking, selecting *More Commands* and selecting *Operator Override* and setting 100%. Press *enter* and *Send*.
3. Repeat step 1 for the A4 Damper. When override is successfully performed, a pop-up box should appear indicating such.
4. Wait approximately 10 minutes, this allows time for dampers to close and settings to fully adjust.
5. Now Operator Override the A1 and A6 dampers by setting the values to 0%.

OPERATOR OVERRIDE

Do NOT use the ADJUST function, just the OVERRIDE function.

1. This can be used to set approximate conditions so that the system doesn't auto adjust during opening of doors, lowering the lift etc.
2. Remember to *Remove Operator Override* when returning to the controlled program or when leaving for the day.

HELPFUL TIP

It can be useful to set the steam generators to set conditions when outside conditions are not too variable. Setting output at around 50% can help to keep %RH in range when lowering the lift. This helps to keep them from shutting off or ramping up too much between burns.

APPENDIX D – LabVIEW Troubleshooting

LabVIEW

Always assure that all connections are made when using the BurnTest.vi.

Common pitfalls:

- Incorrect sub-vi's referenced; i.e. ReadScale.vi
- Incorrect save file path
- Drivers not up to date/installed
- Program will not function properly if all the drivers are not communicating properly
 - Sometimes it helps to plug in the clicker or balance while the LabVIEW program is open. This will queue a prompt about what to do with "USB:6008." From here you can select "Open a Program" then find LabVIEW and open the program. This helps to assure that the drivers are communicating properly with the program
- Need to use Test Balance #17

LabVIEW Notes from 2019

When attempting to connect to the LabVIEW program in fall of 2019 there were several issues we encountered.

1. USB and serial drivers. We have not had an issue with the USB-6008 NI device and communicating to the correct driver when the initial installation goes through. This is for the Burn test clicker. Instead issues have been observed with the USB-485 device which Windows update will even struggle with to find the proper Serial driver. Much of this conversation is captured by the email conversation with the NI Technical Support staff at the end of this document.
 - a. The NI-Serial and NI-VISA downloads appeared to fix the issue, but the user needs to assure that the version they download is compatible with the version of Windows (i.e. Windows 10) and the LabVIEW (year) version. These downloads and links are included in the email conversation.
2. If the USB-485 appears but there is no drop down menu (either under Windows Device Manager or NI-MAX), it would be concluded that although the USB-485 is operating, the COM port driver did not install or is not functioning properly.
3. As always, the programmer needs to assure that the subVIs are working properly. Go as far down as you can in the block diagram to assure SetupReadScale.vi is working. The most common issue here is the incorrect COM port being selected. Use NI-MAX to help determine what port to select. Once SetupReadScale.vi is working, make sure ReadScale.vi is properly reading the scale. If these two subVIs are properly functioning then the BurnTest.vi program should function properly.
4. Another watch out situation is not having the SubVIs available on the desktop etc for the BurnTest.vi program to reference. It is good practice to keep these saved in several locations.
5. The filepath for each of the excel documents to write also need to exist on the computer of interest. This can be changed in the block diagram by right clicking the file path and selecting "Browse for path." You can then select where ever you would like these files to be written and saved.

6. Right now the program functions from Hunter's gov't computer and the LFRT laptop. It would appear that the over laptops will require a restore or some kind of equivalent to assure that any corrupt drivers are removed and then the programs be reloaded with all the correct drivers.

Dated 09/26/2019

Hello Hunter,

My name is Oscar Fonseca. I am a Technical Support Engineer with National Instruments. I want to thank you for using our support and I offer my assistance to help you with this case.

The USB-485 cable needs of the NI-Serial driver in order to get it work. In the following link you can find the compatibility between the driver and Windows.

NI-Serial and Microsoft Windows Compatibility: <http://www.ni.com/product-documentation/8402/en/>

Additionally in here you can find the download page for the NI-Serial: <https://www.ni.com/en-us/support/downloads/drivers/download.ni-serial.html#305457>

In case you need another version of the driver beside the available in the page please let me know.

Regards,

Oscar Fonseca
Technical Support Engineer
National Instruments
www.ni.com/support

Hello Oscar,

So I have gone through the NI-Serial download but upon restart I am unable to associate the hardware with the driver and the wizard doesn't find any drivers associated with the "unknown device"

Any help you can provide is appreciated



Hunter Jones
Project Leader-Chemist
Wildland Fire Chemicals

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Caring for the land and serving people

Hello Hunter,

I am so sorry hear that. Can you please send me a screenshot of the 'Devices and Interfaces' and 'Software' that you have installed in MAX?

Have you tried testing the cable in another PC?

Also, after the you taken the screenshots follow these steps:

1. Delete the unknown device and port in MAX if you see anything. This will allow the device to reinstall the next time we plug it in.
2. Delete the unknown device in Windows Device Manager.
3. Uninstall your version of NI-Serial, NI-VISA, and DAQmx if you have them installed.
4. Restart your computer
5. Install NI-VISA from here: <http://www.ni.com/download/ni-visa-4.6.2/1605/en/>
6. Install NI-Serial from here: <http://www.ni.com/download/ni-serial-3.9/3621/en/>
7. Verify that you can open MAX.
8. Plug in your NI USB-485 cable without the device connected.
9. Check to see if the cable port appears in MAX.

The above due that sometimes when the PC recognizes the device/cable as unkown it will keep doing so until the settings are reset.

Regards,

Oscar Fonseca
Technical Support Engineer
National Instruments
www.ni.com/support

When plugging the NI USB-485 into a different computer it also registers as an “unknown device” and notes that the driver is unavailable. Still working through the re-installation from the list as we speak. Just wanted to get you that information since I didn’t include it earlier



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Thanks for keeping me updated, yes well the behavior in the other PC is expected if you don't have the driver. I apologize for not clarifying that you needed the driver installed. As soon as you finish those steps please let me know. If your problem persists after the aforementioned, please send me a NIMAX technical report.

Creating a MAX Technical Report to Document Configuration

Information: <https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z000000P9mP&SAS&l=en-US>

You can follow the above document to generate the report.

Regards,

Oscar Fonseca
Technical Support Engineer
National Instruments
www.ni.com/support

Thanks for the quick reply,

So the MAX is not recognizing the USB settings at all. I already checked that you have everything you need to make it work. Please as additional step can you check how is displayed in the Windows Device Manager?

Also you can as I said, install the drivers on another PC and check if that way you can recognize it. Also, if you have another cable will be good to test that other on the first PC to narrow down the problem either from the PC or the cable.

Regards,

Oscar Fonseca
Technical Support Engineer

National Instruments
www.ni.com/support

Ok so I have attached what shows up from the windows device manager and the Devices and Printers.

I checked another PC after downloading the NI-Serial and the cable appears to be working (a little bit of hope).

I am going to see if I can communicate with the other computer setup insitu to see if that has any promise.

As always, thanks again!



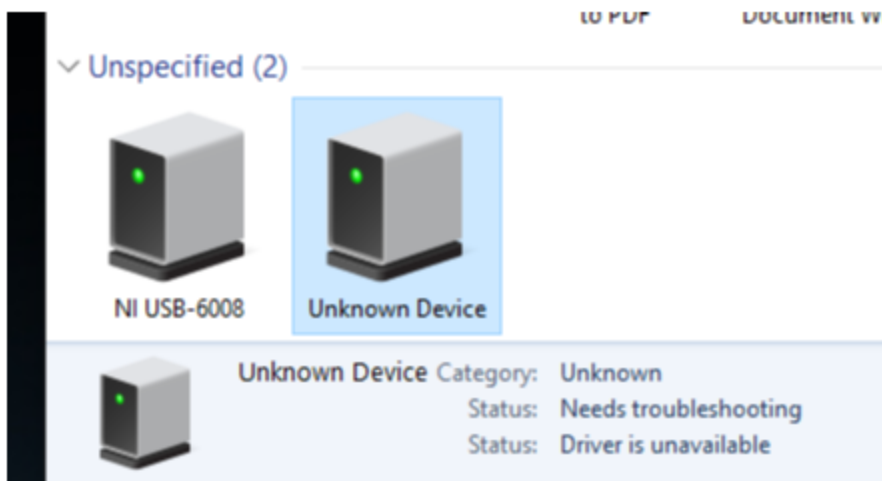
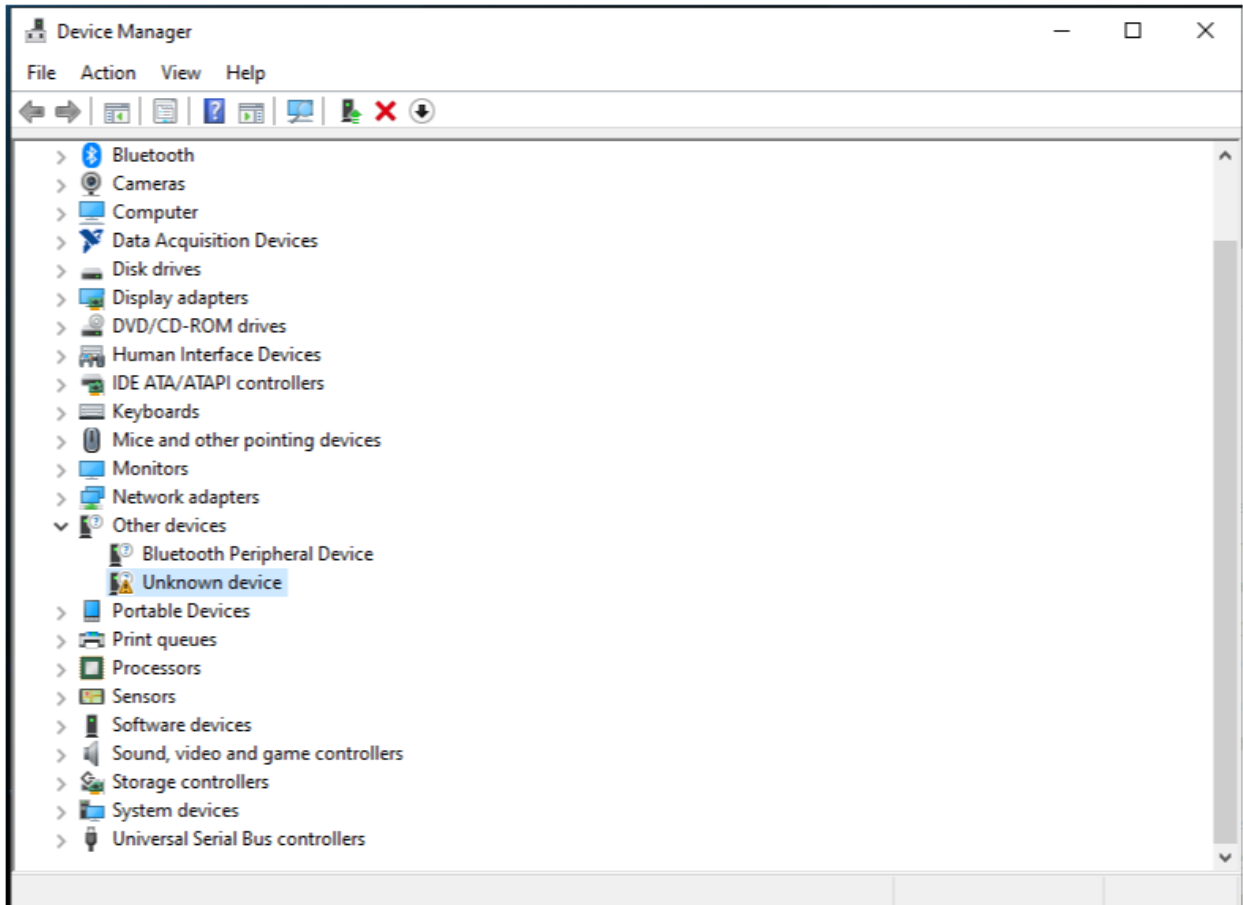
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Yes with the screenshots from the windows device manager we can tell that at least is recognizing something so, keep the test with the other PC you mentioned. Maybe a force reinstall of the drivers on the PC of the issue can solve it.

Force Reinstall Non-Working or Corrupt NI

Software: <https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z000000P8U0SA>

[K&l=en-US](#)

If that doesn't do it we may even need to reinstall all NI software or re-imagine the PC. I will keep looking for reported issues regarding this cable in order to not depend on a reset.

Always a pleasure to help you,

Oscar Fonseca
Technical Support Engineer
National Instruments
www.ni.com/support

Thanks Oscar,

So on my second computer I have been successful getting the USB-485 to appear as working properly so it appears that the driver is now communicating. We have a subVI called SetupReadScale.VI that now properly recognizes the USB, but now my ReadScale.VI is having an issue with the Read-VISA and has a timeout error as described [here](#)

I have attached the Vis in case it helps to look through them but if screenshots are more helpful please let me know. I have done this several times with *highlight execution* on and it continues to run through well until it gets to the Read VISA where the timeout occurs.

I probably should note that the USB-485 is then chained into a 485-to-XLR3 cable which directly connects to the scale. Is there yet another driver that I should look into for this connection?

I appreciate any guidance you can provide.

That is great advance Hunter,

To verify the system is communicating you can use the VISA Test Panel on NIMAX and try to send a couple of basic commands maybe an echo or anything that proves the scale is sending data to the PC. The XLR cable should not be an issue as long as you are sure it works and is mapped as it should.

I will look into your VIs, but please try with the Test Panel too.

Regards,

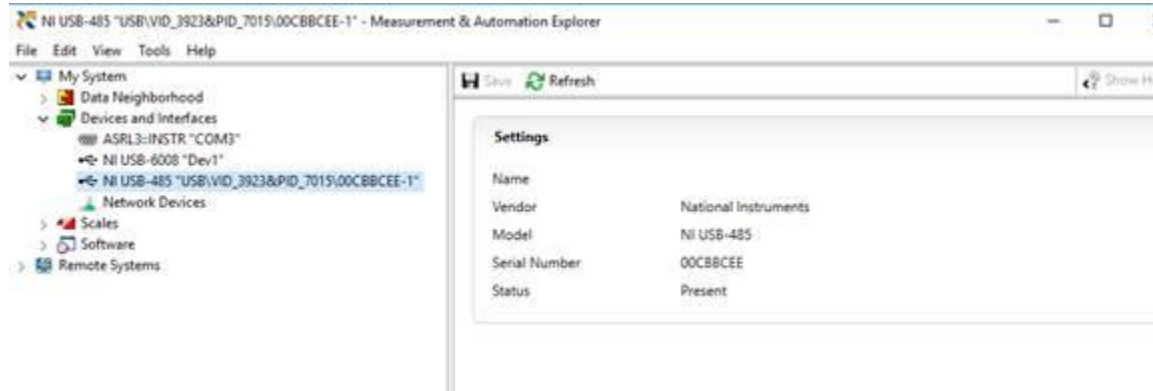
Oscar Fonseca
Technical Support Engineer

National Instruments
www.ni.com/support

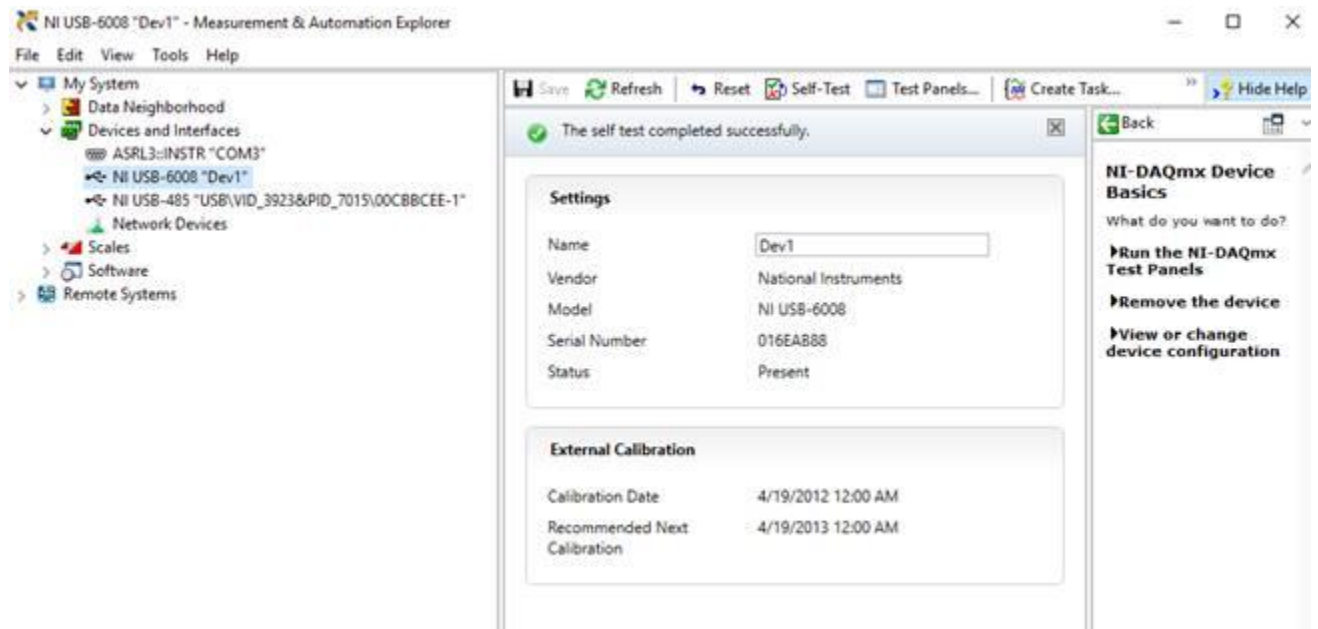
Hello Oscar,

I am afraid there is something off about my setup as I cannot even select the VISA test panel or the self test or test panels as is available when I select the USB-6008.

USB-485



USB-6008



Not sure what this might be indicative of?

Well as I see it the MAX is recognizing the cable as it should, however your instrument should be displayed in a dropdown menu under the 485. So, it seems something happening maybe with the XRL3 or the scale itself.

Can you change the other cable or maybe update any driver needed for the third party instrument?

You can also check if your PC sees the scale on the Windows Device Manager. This document can help you with the issue.

USB Device Missing in NI-MAX but Is Present in Windows Device Manager: <https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z0000019La2SAE&l=en-US>

This talks about instruments that are not handled by the proper driver, so you can check that too.

Regards,

Technical Support Engineer
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