APPENDIX D

Health and Safety Plan

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Site-Specific Health and Safety Plan
Union Pacific Railroad – Trentwood Site Remedial Actions

Site Address Trentwood Site, Veradale, Washington

Sullivan Rd. Spokane Valley, WA 99216

Revision No:

Date: May 17, 2022

It is company policy to complete a HaSEP form including a task-based Health, Safety and Environment (HSE) risk assessment for every project that includes site work, working alone or international travel.

To get an updated table of contents, please right-click the table of contents below and choose 'Update Field'

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1.0 CONTACTS LIST SUMMARY

1.1 Emergency Contacts

Contact	Number
Ambulance	911
Fire	911
Police	911
Crisis Response Hotline (Outside Canada)	+1 403-775-1041
Crisis Response Hotline (Within Canada)	
Golder National Health, Safety, Security, and Environment Advisor - Renee Weaver	+1 336-707-3869
Human Resources-Local	
International SOS, Member ID: 11BYCA084630	+1 215-942-8226 (Philadelphia)
Local Electrical Authority	
Local Gas Authority	
Local Telecom Authority	
Local Water Authority	
Media Relations (Golder) - Wendy Stoveland	+1 914-584-1603 (media_relations@golder.com)
Roadside Assistance	
Spills Reporting	
TriangeNow	+1 877-311-0038

1.2 Golder Contacts

Role	Name	Office	Cell
Project Manager	Ted Norton	+1 425-883-0777	+1 206-755-4970
Project Director	Matt Wickham	+1 512-220-7459	+1 361-652-1756
Program Director	Eric Matzner	+1 512-220-7457	
Site Safety Officer	Eric Adams	+1 425-883-0777	+1 425-941-9367
Field Hydrogeologist	Matt Thomas	+1 503-607-1820	+1 423-987-4716

1.3   Missed Check-in Contacts

	Name	Phone	Cell
Project Manager	Ted Norton	+1 425-883-0777	+1 206-755-4970
Project Director	Matt Wickham	+1 512-220-7459	+1 361-652-1756

1.4   Client and Site Contacts

Nearest Golder office	USA - Redmond
Phone	+1 425-883-0777
Fax	+1 425-882-5498
Email	

Role	Name	Number
Contact person on site	Ted Sager	Office: +1 425-883-0777 Cell: +1 425-245-3284
Client safety contact	Kristen Stevens	Office: +1 562-756-0076 Alternate: +1
Company Golder reports to	Union Pacific Railroad	Office: +1 303 405-5034 Alternate: +1 562 233-9363
Company reporting to Golder	Environmental West Explorations	Office: +1 509-534-2740 Alternate: +1 800-635-4762
Golder overall site supervisor and alternate:	Ted Norton	Office: +1 425-883-0777 Cell: +1 206-755-4970
Golder Project Director	Matt Wickham	Office: +1 512-220-7459 Cell: +1 361 652-1756

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. Choose to work safely and in compliance with all HSE requirements.

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Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood
HASP 2020 RA-05172022

2.0 PROJECT PROPOSAL DETAILS

Project/Proposal Number	19119180	Start Date	April 1, 2022	End Date	December 31, 2022
Project Title	Union Pacific Railroad - UPRR Trentwood, Veradale, Washington				
Client Name	Kristen Stevens				

Brief description of project and scope of works (include any hazardous activities, if known)

The site is the location of an aluminum dross stockpile area that was used as the feedstock for a secondary aluminum metal recovery process. Aluminum recycling is no longer conducted at the property and the dross is considered a waste material. The dross stockpile and adjacent soils impacted with dross constituents at concentrations above cleanup levels will be removed/excavated and transported off-site for disposal at an approved landfill. Activities will consist of providing construction oversight, XRF testing and environmental soil sampling to ensure removal activities are adequate to meet cleanup criteria on the UPRR property and the surrounding Pentzer and WSDOT properties.

Primary hazardous / fatal risk activities include:
- Working around heavy equipment
- Working near overhead utilities
- Working near underground utilities
- Ground stability/ working near excavation greater than 4 feet deep
- Driving to jobsite

3.0 GOLDER TEAM

Name	Office	Contact number (cell phone)	Office Phone	Role
Eric Adams	Redmond	+1 425-941-9367	+1 425-883-0777	Site Safety Officer
Ted Norton	Redmond	+1 206-755-4970	+1 425-883-0777	Project Manager
Matt Wickham	Round Rock	+1 361-652-1756	+1 512-220-7459	Program Director

Project Manager (PM)

- Appoint a competent site supervisor and alternate. For sites with multiple Golder projects/disciplines at work, coordinate with the overall site supervisor

- Oversee/develop hazard controls including work instructions and

- Assign only adequately trained and competent employees to the project

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Site Supervisor

- The site supervisor is responsible for the safety of all Golder employees, subcontractors, visitors and public on the parts of the site under Golder control.

- Communicate all site hazards to affected parties, in real time, as hazards, conditions and employees change.

- Ensure that work is undertaken in accordance with the hazard controls included in this HaSEP.

Contractor

- All plant and equipment is maintained in a safe working condition

- All plant and equipment are to be registered/licensed and electrical equipment tagged and tested

- Potential hazards are to be controlled (e.g., cage over rotating parts)

- You will report any identified hazards to the Golder Associates field staff member

Field Staff

- Inspect your worksite and equipment before starting work

- Apply the controls outlined in this HaSEP

- Look out for the safety of yourself and others

- Report unsafe acts, conditions and incidents to the site supervisor

4.0   CLIENT/SITE LOCATION DETAILS

4.1   Client/Site Location Details

Project location map (paste URL here)	**https://www.google.com/maps/@47.6778855,-117.2020461,502m/data=!3m1!1e3**

4.1.1   *Site Description*

If the project is near another Golder Office, has the local Office been notified of the work?

☐Yes ☒No

Site Name	Trentwood Site
Address	Sullivan Rd. Spokane Valley, WA 99216
Coordinates	47.6777265, -117.1982753
Description	Access road is located on the left (west) of Sullivan Rd.
Access info	Enter site work area through Kemira facility entrance
Previous land uses	Aluminum metal recovery processing
Site Receptors that maybe impacted by the proposed work	Site receptors that may be impacted by the proposed work are ecological.

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Additional Info	Contamination levels on-site to date meet remediation levels. Workers are not anticipated to be exposed to contaminant levels that exceed remediation levels.		
HSE Induction / orientation provider	☒Golder	☐Client	☐Contractor
Site Contact Numbers	**Field cell phone**		**Satellite phone**	
	Other			
Nearest Golder office	USA - Redmond	**Address**	18300 NE Union Hill Road, Suite 200, Redmond, Washington, USA 98052
Opening days and hours	M-F 8:00 to 5:00	**Email**	pnwprojectcoordinators@golder.com
Phone	+1 (425) 883-0777	**Fax**	+1 (425) 882-5498
Google Maps			

5.0   CHECK-IN SYSTEM

5.1   Check-in contacts

	Primary	Secondary
Name	Ted Norton	
Phone/Email	206-755-4970	
Check-in frequency*	At start of the day and end of the day	
By phone	☒	☒
By email	☒	☒
By SMS	☐	☐
On site	☐	☐

5.2   Missed Check-in Procedure

Within 2 hours of missed check-in time:

1. Attempt to contact employee
2. Contact accommodation or other project personnel to determine last contact with employee
3. Notify Project Manager.
4. Project manager to determine timing of further action, based on project details.

Within 4 hours of scheduled call-in time:

1. Contact client and request assistance to locate employee.
2. Notify Project Director, Office Manager, and local authorities (as appropriate)
3. Initiate Crisis Response Plan (as appropriate)

☐Does missed check-in procedure for this project deviate from the standard procedure?

6.0 RISK REGISTER

6.1 Risk Definition

Health & Safety Consequence or Impact Description:

Catastrophic	5	Death, toxic release off-site with detrimental effect, very high financial loss
Major	4	Extensive injuries, loss of production capability, off-site release with no detrimental effects, major financial loss
Moderate	3	Medical treatment required, on-site release contained with outside assistance, high financial loss
Minor	2	First aid treatment, on-site release immediately contained, limited financial loss
Insignificant	1	No injuries, low financial loss

Environmental Consequence or Impact Description:

Catastrophic	5	Release to air, water or land with life threatening impacts on or off site. e.g.: human death(s); destruction of endangered species; habitat destruction; human water supply or food destruction; localized extinction of a species; Protracted or extensive clean up requiring external resources.
Major	4	Release to air, water or land with destructive impacts on or off site. e.g.: destruction of animal / fish life; habitat damage; making air, water or land unfit for use by living things; destruction of known or unknown indigenous people's / heritage sites; irreversible alteration of the natural environment or its aesthetics; dust or noise affecting a region; large volumes of contaminated or hazardous waste. Requires clean up using external resources.
Significant	3	Release to air, water or land with impacts requiring long term recovery. e.g.: habitat disturbance; damage to indigenous people's/heritage sites; alteration of the natural environment or its aesthetics; generation of contaminated or hazardous waste, or large volumes of solid waste; dust or noise affecting the immediate area. Clean-up can be managed by internal resources.
Minor	2	Release to air, water or land with resulting in localised damage to worksite requiring short term recovery. e.g.: readily repairable impacts (physical or aesthetic) to the natural environment, indigenous people's/heritage items, property, or business operations; public nuisance (noise, dust, odours); generation of small quantities of waste. Clean up can be completed by internal resources.
Insignificant	1	Release to or disturbance of air, water or land resulting in no impact or localised (i.e. isolated to worksite) impacts within authorized limits. Short term impact with complete recovery. Clean up can be completed by person(s) involved.

Likelihood Description:

Almost certain	5	Incident will occur in every circumstance (e.g. every time).
Likely	4	Incident will probably occur (e.g. 1 in 10 times).
Possible	3	Incident may occur at sometime (e.g. 1 in 100 times).
Unlikely	2	Incident not expected to occur, but conceivable (e.g. 1 in 1, 000 times).
Rare	1	Incident would only occur in exceptional circumstances (e.g. 1 in 10,000 times).

Risk Analysis Matrix:

Likelihood:		Consequence:				
		Catastrophic 5	Major 4	Moderate 3	Minor 2	Insignificant 1
Almost certain	5	25 (VH)	20	15	10	5
Likely	4	20	16 (H)	12	8	4
Possible	3	15	12	9 (M)	6	3
Unlikely	2	10	8	6	4 (L)	2
Rare	1	5	4	3	2	1 (VL)

0-3 (VL) Very Low Risk	No additional controls necessary. Continue to monitor risk.
4-6 (L) Low Risk	Consider additional controls to further reduce risk.
8-12 (M) Moderate Risk	Controls must be implemented to reduce risk.
15-16 (H) High Risk	Risk Unacceptable, do not proceed without controls, minimum of 'engineering controls'.
20-25 (VH) Very High Risk	Risk Unacceptable, do not proceed without controls, elimination or substitution controls required.

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6.2   Risk Register

Header key:

- PA: Persons Affected
- IC: Initial Consequence
- IL: Initial Likelihood
- IR: Initial Risk

- RC: Residual Consequence
- RL: Residual Likelihood
- RR: Residual Risk
- AC: Additional controls

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Driving Vehicle (Rental/Fleet)	Driving Vehicle	Golder Employee	4	2	8	Follow Motor Vehicles and Driving on Company Business SWP24). If unfamiliar with the vehicle, allow sufficient time to familiarize oneself with the controls of vehicle. Verify the vehicle is in roadworthy condition, suited for the intended purpose, and equipped with the appropriate tires (including a spare). Ensure any signs, stickers, or labels are affixed in such a manner that they do not obstruct the driver's vision or impede the driver's use of any controls. Drivers will have a current driving license and be fit to drive. Adhere to all roadway regulations and follow speed limits. Do not drive in adverse weather or when fatigued. Equip vehicle used for on-site work with fire extinguisher and first aid kit. If any safety concerns are identified, the vehicle must not be used. For Golder fleet vehicles, report vehicle deficiencies to the Operations Manager as soon as they are noticed. The Operations Manager, or his/her delegate, will arrange for maintenance of the vehicle.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Pinch Points	Crush or Caught Between	Golder Employee	4	3	12	If required to work near equipment you must eliminate or guard if possible and clearly identify pinch points. Train all workers in the area about the pinch points and guards that are in use. Do not wear loose clothing, jewelry, or have loose hair around moving equipment with pinch points.	3	2	6	
General	Driving on Unpaved Roads	Dust Generation	Golder Employee/Community	2	3	6	Consult with site representative prior to commencing work to determine if dust is likely to create concern. If possible, modify procedures or timing to reduce impact. Drive slowly in dust prone areas. Applying gravel or vegetative cover to a dirt road can also reduce dust. Monitor dust generation visually and apply water suppression or other dust control products, as feasible and allowed by local regulations.	1	2	2	
General	Undertaking Work Without Adequate Rest	Undertaking Work Without Adequate Rest	Golder Employee	4	3	12	Identify hours of work and comply with the Fitness for Duty and Fatigue SWP27. There should be a minimum of one 30-minute break in each 8-hour work period or part thereof. If a period of 12 hours has been worked, an employee is required to ensure that a break away from work of at least 8 hours is taken prior to returning to work. Non-work activities must allow for sufficient rest.	3	2	6	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Working Abnormal Shifts	Working Without Adequate Rest	Golder Employee	4	3	12	Comply with the Fitness for Duty and Fatigue SWP27. Conduct a fatigue assessment prior to starting the project. Schedule work during daylight hours, if possible. If the project requires night work, modify the task to give people the opportunity for adequate rest between night shifts and time to acclimate. Avoid switching shifts during your rotation (i.e., stay on night shift or day shift) to allow your body to adjust to the working hours.	3	2	6	
General	Working Long Hours	Working Without Adequate Rest	Golder Employee	5	3	15	Identify hours of work to comply with the Fitness for Duty and Fatigue Management SWP27. All activities should be designed to fit into the standard workday/work shift of 12 hours (including travel time). If work exceeds the maximum, a fatigue risk assessment must be conducted and permission sought by PM or OM. Employees shall not drive if the work period has exceeded 14 hours - find alternative methods of transportation.	3	2	6	
General	High Noise Environments	Noise	Golder Employee	4	4	16	Follow the Hearing Protection SWP21. Evaluate the noise level. If it is difficult to maintain a normal conversation at a distance of 3 feet, institute controls to manage the hazard. Install insulation or other noise damping techniques where possible. Establish task rotation to decrease exposure times to hazardous noise. Wear hearing protection with a sufficient protection factor to mitigate the noise hazard. This could be properly fitted ear plugs or a combination of both ear plugs and ear muffs. Consider using a dosimeter to test noise levels.	2	2	4	

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Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood HASP 2020 RA-05172022

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Overhead Hazards - Review Conditions	Overhead Hazards - Review Conditions	Golder Employee	4	3	12	Follow Overhead Hazards SWP11. When working with heavy equipment, such as drill rigs, dump trucks, and front-end loaders, the area above the zone of operation must remain clear of overhead hazards and obstructions. Review overhead hazards with equipment operators before commencing tasks. Consider the route of travel for this equipment and be aware of/review overhead hazards. Check local regulations and possibly contact local utilities for minimum clearance distances from overhead power lines.	3	1	3	
General	Overhead Hazards - Signage/Communication	Overhead Hazards - Signage/Communication	Golder Employee	4	3	12	Clearly mark low hanging hazards with bright colors to increase visibility of the hazard. If appropriate, post warning signs. Discuss location of overhead hazards with site personnel at daily tailgate meetings and when tasks or site conditions change.	3	1	3	
General	Slips, Trips, and Falls	Slips, Trips, and Falls	Golder Employee	4	3	12	Follow Slips, Trips, and Falls SWP14. Use care and attention when walking. Before starting work, conduct a survey of the area looking for uneven ground, mud, water, loose material, or other conditions that could cause slips, trips, or falls. In cold weather environments, walkways shall be sanded, salted, or cleared of snow and ice as soon as practicable. Establish level pedestrian footpaths, avoiding slippery surfaces wherever possible. Relay identified hazards to others working at the site. Wear footwear appropriate to the tasks and identified hazards. Footwear should be in good condition and provide effective traction and ankle support.	2	2	4	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Traffic Management - Private Property	Traffic Exposure	Golder Employee	5	3	15	Follow the Traffic Safety SWP37. All project personnel must understand the hazards posed by traffic at the work site. Where possible, request the client close the area to vehicle traffic. Where closure of the site is not possible, physical barriers must be established if working near vehicles. Develop procedures to control traffic flow in the work area. These procedures should include signage (flaggers if appropriate) and barriers that will delineate the work area and provide sufficient separation between the crew and all traffic. Train all personnel working at the project site in the traffic control procedures.	4	2	8	
General	Changing Weather Conditions	Changing Weather Conditions	Golder Employee	4	3	12	Assess forecasted weather conditions before beginning work. Postpone activities if weather conditions are not favorable. Remain vigilant at all times and continually re-assess weather conditions. Consider carrying a weather radio with spare batteries. Know how to contact the local weather resources. If weather conditions deteriorate, stop work and seek shelter as necessary. Understand who is responsible for suspending work due to extreme weather conditions.	3	2	6	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Heat (SWP 04)	Heat stroke, heat stress, sunburn	Golder employee	4	3	12	Check daily weather reports. Wherever possible, reduce temperature and humidity through air cooling and increased air movement. Assess physical demands of the work and provide equipment that will reduce the physical demands. Work in shaded areas, or provide barrier to give shelter from the sun. Schedule work to allow workers to acclimatize. Schedule work to cooler times of the day. Increase the frequency and lengths of break periods. Provide a cool, shady place to take breaks. Assign extra workers or slow down the pace. Drink plenty of fluids. Make water and sports drinks available. Use a buddy system; check each other frequently for signs of heat stress (e.g., disorientation, lack of sweat, fatigue). Assess each worker for factors that may contribute to early onset of heat stress. Wear hats and light-colored loose clothing. Cooling vests may be required. Consider the additional stress load caused by PPE such as Tyvek coveralls. If someone is suffering from heat-related illness:- Move the person to a cool area, maybe the air-conditioned vehicle. - Give the person small amounts of cool (not cold) water.- DO NOT leave the person unattended.- Immediately seek qualified medical assistance if the person does not recover or their condition worsens.	3	2	6	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Lightning	Lightning	Golder employee	5	3	15	Check daily forecast. Carry a weather radio and extra battery as well as a personal lightning detector. Postpone outdoor activities if thunderstorms are imminent. Stay away from tall objects such as towers, fences, telephone poles and power lines. Avoid touching metal if you take shelter in your car. If you must take shelter outdoors, find a low spot away from trees, fences and poles. If you feel your skin tingle and hair stand on end, squat low to the ground, on the balls of your feet. Place hands over ears and your head between your knees. Make yourself the smallest target possible, with minimum contact with the ground. DO NOT lie down.	3	1	3	
General	Sun (SWP 04)	Sunburn	Golder employee	4	3	12	Sunburn can occur even when the weather is not hot. It is possible to get sunburn in the winter time or on water. Check UV rating, wear sunscreen, look for shade, protect eyes with shaded glasses.	2	3	6	
Tasks	Working Around Heavy Equipment (SWP 18)	Working around heavy equipment	Golder employee	4	3	12	Heavy equipment activity may change daily or hourly, with differing potential hazards that need to be identified and addressed. Never approach an operational piece of heavy equipment until the operator is aware of your presence, your desire to approach, and signals the OK – where possible use radio contact. Stand in a safe location. Never work or pass directly under a lifted or suspended load. Whenever a Golder employee works on a project site where heavy equipment is operated, the Working Around Heavy Equipment SWP 18 must be followed.	4	2	8	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Tasks	Flying objects/debris/crushing	Flying objects/debris/crushing	Golder employee	5	3	15	Do not climb on a stockpile of horizontally stored piles. Always stand a safe distance (at least 1 pile length) from the crane when a pile is being lifted from the ground and located in the leads. Always face and observe the pile during lifting. During pile driving, stand as far away as practical from the pile entry point, (at least ½ pile length) but you must still be able to observe and record the blow counts. This permits a reasonable view of the hammer, and permits energy assessment. Never stand directly in front of the crane. If a cable fails, the boom will generally fall directly in front of the crane cab. Only approach the pile entry point to measure "Set" if unable to observe set from a distance. The pile driving crew can normally assist in this activity. Watch for timber particles from driving cushions, they may be very hot, or on fire.	3	3	9	
Tasks	Drill rig/ construction equipment	Piling rig/ construction equipment	Golder employee	5	3	15	While working around heavy equipment, follow SWP 18. The equipment operator has a limited field of vision. When approaching the equipment, establish eye contact with the operator and wait to a receive an indication that the operator has seen you. When visual contact is made, advise the operator that you wish to approach the equipment. The operator may want to complete a task prior to shutting down the equipment. If so, do not approach until the operator signals you to advance.	3	3	9	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Work Environment	Dust (or airborne particles) - On-site	Exposure to dust	Golder Employee	3	4	12	There are many types of hazardous dust that could be encountered on a project site. Exposure to dust can irritate eyes, nose, throat and the upper respiratory system. Some dusts are also skin irritants. Determine the type of dust(s) present at the project site. Dusts to consider when assessing this hazard include silica, cement, diesel particulates, bentonite, asbestos, and heavy metals. It may be necessary to conduct an industrial hygiene survey of the site to determine if dust concentrations are above nuisance levels. A site-specific dust monitoring plan is provided in Appendix E, that identifies monitoring procedures and engineering control measure to minimize exposures. Controls could include, applying water or dust suppression liquids, and potentially use of respiratory protection and eye protection, if required.	2	3	6	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Work Environment	Access to rail corridor	Access requirements – awareness and training	Golder employee	4	2	8	Working within the rail corridor or within 6 feet (or greater, dependent on specific railroad requirements) of any railroad track requires permission and information from the rail authority. Information to include designated parking areas, speed restrictions along track, and accessible gates. All on site Golder employees are to complete relevant rail induction or training based on complexity of the job and potential hazards related to the rail site. Documented assessments shall be used to confirm that employees have the knowledge and have demonstrated skills to safely perform their work. Retraining and testing shall be required for unsatisfactory/unsafe performance of job assignments.	2	2	4	
Work Environment	Derailment	Risk of derailment	Golder employee	5	2	10	Loose material shall not be allowed to fall or be deposited on or adjacent to the tracks. If this occurs, the client shall be notified immediately. Any damage to rail infrastructure must be reported to the rail operator immediately.	5	1	5	
Work Environment	Movement of switches, turnouts, or points	Movement of switches, turnouts, or points	Golder employee	3	3	9	Keep objects and parts of the human body away from automatic switches, turnouts or points as they may activate without notice. Remain at least 30 feet away from these devices. If ground penetration work is being performed near automatic or manual points sites, regular inspections of these sites shall be undertaken. The rail operator shall conduct these inspections.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Work Environment	PPE For Rail Safety	Visibility in railroad yards	Golder Employee	4	4	16	Approved hard hats, safety boots, high visibility vest (orange or yellow), gloves (as needed) and safety glasses with permanently attached side shields shall be worn in designated areas in accordance with rail yard owner/client requirements.	3	2	6	
Work Environment	Rail line crossing	Crossing line where no crossing is designated	Golder employee	4	2	8	In many remote areas there are no designated rail crossing locations. If no designated rail crossing is available do not cross within 2510 feet of the end of a parked rail car, locomotive or equipment (except when proper protection is provided), do not cross between uncoupled cars, stop, look and listen prior to proceeding across the tracks, and never step on rails, as they may be slippery.	4	1	4	
Work Environment	Rolling rail stock	Rolling rail stock	Golder employee	5	2	10	Request the rail authority place track protection signs, such as speed restrictions, detonators, stop or slow signs and other warning signs. Communication must be maintained with track protector and the client prior to, and during the shift. If working near an operating rail line, competent persons shall be positioned to observe for, and warn of approaching rolling stock. Golder's equipment shall not be located so it obstructs the view of the train crews, pedestrians or vehicles to any fixed or temporary rail signal, pedestrian crossing, road or rail crossing. All equipment operating adjacent to the tracks must cease work so as to avoid obstruction to the passing train. Excavator booms and similar equipment shall be lowered to the ground until the train has passed the work area. Never attempt to crawl under or climb over moving rail	5	1	5	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
							equipment or attempt to cross in front of moving equipment. Rail equipment may begin to move in either direction at any time, so you must always remain alert. Never position your body in a place where it may be pinched or crushed by rolling stock.				
Work Environment	Visibility	Colored clothing and lights	Golder employee	4	2	8	No red or green objects (including lights, clothing, barrier mesh, hardhats) shall be used on or near live tracks as these may be mistaken for rail signals. Color of clothing to be approved by rail operator. If temporary lighting is required to be positioned in the vicinity of the tracks, white lights shall be to the approval of the rail operator.	2	1	2	
Work Environment	Employee Health and Wellbeing	Employee Health and Wellbeing	Golder Employee	4	2	8	Employees shall not consume food or beverages in a toilet room, or in any area exposed to a toxic material.	3	1	3	
Unique Issues	Biological Hazards- Hepatitis, Rabies, Etc. (SWP 03)	Biological Hazards- Hepatitis, Rabies and Tetanus (SWP 03)	Golder Employee	4	2	8	Obtain a rabies vaccination if working in areas with a known rabies hazard. The most common wild reservoirs of rabies are raccoons, skunks, bats, foxes and coyotes. If traveling to areas of known Hepatitis A outbreaks or otherwise at high risk, obtain Hepatitis A vaccinations. In high-risk areas, minimize Hepatitis infection risk by avoiding potentially contaminated water or food, such as drinking beverages (with or without ice) of unknown purity, eating uncooked shellfish, and eating uncooked fruits or vegetables that are not peeled or prepared by you personally. Hands shall be washed prior to eating of handling food. According to the CDC, everyone needs protection from tetanus. Make	3	2	6	

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Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
							sure you are up to date on your tetanus vaccinations (10-yr boosters). Immediate and proper wound care can also help prevent tetanus infection.				
Unique Issues	Bees, wasps	Bees, wasps	Golder employee	3	3	9	Follow Biological Exposure Risk SWP 3. Check the area for nests. Do not disturb nests. Wear light-colored clothing and cover as much of the body as possible. Avoid perfumed soaps, shampoos, and deodorants. Don't wear cologne or perfume. Avoid flowering plants when possible. Keep work areas clean. Social wasps thrive in places where humans discard food. Remain calm and still if a single stinging insect is flying around. (Swatting at an insect may cause it to sting.) If you are attacked by several stinging insects at once, run to get away from them. (Bees release a chemical when they sting, which may attract other bees.) Employees with a history of severe allergic reactions to insect bites or stings should consider carrying an epinephrine auto injector (EpiPen).	3	1	3	
Unique Issues	Mosquitoes	Mosquitoes	Golder employee	3	2	6	Follow Biological Exposure Risk SWP 3. Wear full length clothing. Light colored clothing makes it easier to see mosquitoes. Avoid working at dawn and dust when mosquitoes are most active. An insect repellent containing diethyl-meta-polyamide (DEET, > 20% for longer protection) or something similar (e.g., picaridin, or oil of lemon eucalyptus) should be applied to clothing and skin before going into the field. Permethrin may be used, but on clothing only. The repellent should be applied and re-applied according to the manufacturer's	3	2	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
							instructions. Determine if area is impacted by West Nile virus, Encephalitis viruses, Dengue fever or Malaria. If so, know the symptoms of infection and seek medical treatment, as needed.				
Unique Issues	Snakes - Potential Encounters	Snakes - Potential Encounters	Golder Employee	3	3	9	Do not handle snakes (even those that appear to be dead). Wear boots, leather gloves (when appropriate), long pants, and long-sleeved shirts to reduce the potential for envenomation. Tread heavily - vibrations can alert snakes to your presence and give them time to move away. Never place hands or feet where you cannot see them and always look closely when near hollow logs, piles of wood or trash, boulders, and pipes. When possible, ask the client to clear long grass. Where this is not practical, plan your route to avoid excessively overgrown areas. Consider wearing snake gaiters in dense vegetation.	3	2	6	
Unique Issues	Spiders	Spiders	Golder employee	2	3	6	Follow Biological Exposure Risk SWP 3. Do not place bare hands in hollow logs or under piles of wood or trash. Be cautious inside manholes and other confined spaces. Wear leather gloves or similar when handling these items. If boots or clothing removed, check them prior to putting them back on for the presence of spiders. Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores. Bites by most spiders result in local swelling only. If bitten: 1. Remain calm. 2. Clean the area with soap and water. 3. Apply ice to relieve swelling and pain. 4. Elevate bite area, if possible. 5. Seek medical assistance.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
							If possible, collect the spider or remains of spider to facilitate identification.				
Unique Issues	Ticks	Ticks	Golder employee	3	2	6	Follow Biological Exposure Risk SWP 3. Wear full length clothing (tucking pants into socks prevents access for ticks). Light colored clothing makes it easier to see ticks and remove them before they can attach to the skin. Walk in the center of trails. An insect repellent containing diethyl-meta-toluamide (DEET) (20 – 30%) or other effective repellent should be applied to clothing and skin before going into infested areas. The repellent should be applied and re-applied according to the manufacturer's instructions. All clothing should be removed after visiting tick infested areas and the entire body checked for ticks. Paying particular attention to the scalp, areas behind the ears and the back of the head or neck. Review and understand the signs and symptoms of a tick bite.	3	1	3	
Unique Issues	COVID-19	COVID-19	Golder employees and Site workers	4	2	6	Avoid contracting COVID from fellow workers by following protocols presented in Appendix A and all current official State recommendations for self-protection and social distancing. Face coverings will be required for all Golder and subcontractor's employees while within six feet of one another. In addition, Golder Associates Inc. requires all subcontractors to complete a COVID-19 Subcontractors/Subconsultant Health and Safety Verification Form provided to subcontractors during the procurement	3	1	3	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
							process prior to conducting any work on site. Field Staff will confirm with Project Manger the form has been completed.				
General	Operating a Vehicle Around Heavy Equipment	Traffic and Road Conditions (e.g., Heavy Equipment Traffic)	Golder Employee	5	3	15	Seat belts shall be worn by all drivers and passengers in vehicles on company business. The vehicle should have a clean windshield unobstructed by rain, debris, fog, or cracks to the shield. Headlights, tail lights, brake lights, and the car's horn should be fully functional to help alert equipment operators to their presence. When reversing onsite, must have a clear rear view, reverse signal alarm, or an observer who can signal instructions to the driver while reversing. Verify the rules of the road (speed limit, type of vehicles, rules on passing, signage, method of communication with other vehicles) and follow any site-specific traffic control.	4	1	4	
General	Traffic Management - Public	Traffic Exposure	Golder Employee	5	3	15	Follow the Traffic Safety SWP37. All project personnel must understand the hazards posed by traffic at the work site. Evaluate the work area to determine if the 'normal roadway functions' will be impeded by the scope of work. If yes, develop a formal traffic control plan in accordance with local regulations and meeting the requirements specified in the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Train all personnel working at the project site in the traffic control procedures.	4	2	8	

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25/35

Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood HASP 2020 RA-05172022

7.0   PERSONAL PROTECTIVE EQUIPMENT

Item	Required	Provided by Golder	Provided by Client	Specific Requirement
Cold Weather Gear	☐	☐	☐	As necessary
Wet Weather Gear	☒	☐	☐	As necessary
Coveralls				
Disposable	☒	☒	☐	Tyvek or other protective suit when conditions exist where potential exposure to contaminated soil or water is indicated (by air monitoring but below action levels, or by existing analytical data) or when working in wet conditions (Modified Level D). Required when in Level C PPE.
Respiratory Protection				
Face coverings	☒	☒	☐	Wear face covering per State COVID requirements (working within 6 feet of another person).
Half-filter mask	☒	☒	☐	If weather or site conditions create visible continual dust in the breathing zone don a N-95 filter mask.
Half-mask filter respirators	☐	☐	☐	Not Applicable
Full-face respirator	☐	☐	☐	Not Applicable
Gloves				
Mechanical hazard	☒	☒	☐	As needed to mitigate hand/finger hazards.
Mitigate environmental sample cross contamination	☒	☒	☐	Wear nitrile gloves while collecting or handling soil samples
Head Protection				
Hard Hat	☒	☒	☐	At all times (all PPE levels) while drilling and sampling, not necessary for conducting XRF survey

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HEALTH AND SAFETY ENVIRONMENT PLAN (HASEP)

Item	Required	Provided by Golder	Provided by Client	Specific Requirement
Hearing Protection				
Disposable foam ear plugs	☒	☒	☐	At all times near operating machinery (use arm's length rule); when noise level exceeds 85 dB
High Visibility Clothing				
Yellow	☒	☒	☐	Always required while conducting field tasks.
Orange	☒	☒	☐	Always required while conducting field tasks.
Safety Footwear				
Safety boots	☒	☐	☐	Safety-toe boots are to be worn at all times (all PPE levels), except when in areas where standing water or mud are present, use rubber steel-toe boots.
Eye Protection				
Impact resistant safety goggles or glasses	☒	☒	☐	At all times
Splash resistant safety goggles	☒	☒	☐	Required when exposure to high-pressure liquids is possible (steam cleaner). Must be worn when decontaminating equipment with a steam cleaner or pressure washer.
Full-face shields	☒	☐	☐	Required when exposure to high-pressure liquids is possible (steam cleaner). Must be worn when decontaminating equipment with a steam cleaner or pressure washer.
General Protection				
Sun cream or block	☒	☐	☐	As needed
Insect repellent	☒	☐	☐	As needed
Hand warmers / Glove	☐	☐	☐	
Other				
Snake leggings or guards	☒	☐	☐	When walking in highly vegetated areas of the site.

Item	Required	Provided by Golder	Provided by Client	Specific Requirement
Construction attire	☒	☐	☐	100% cotton clothing; blue jeans; shirts with minimum 4" sleeves; long hair must be restrained; no dangling jewelry

8.0   TRAINING

It is up to the Project Manager to arrange for the following training e.g., Confined Spaces.

Course Name	Employee Name or Role
40-Hour OSHA HAZWOPER	All Field Staff
Current annual OSHA HAZWOPER refresher course	All Field Staff
e-RailSafe	All Field Staff

9.0   INCIDENT AND EMERGENCY MANAGEMENT

9.1   Additional Client / Site Reporting Procedures (if ticked provide applicable details in the text box and/or attach relevant documents to this HaSEP.)

In case of injury, administer first aid immediately and, if necessary, transport to the nearest medical facility as soon as possible or call an ambulance. Advise the Golder Project Manager, SSO and Corporate Health and Safety Director as soon as possible of any injury, accident, property damage or near-miss event. In the event evacuation is necessary, first safely shut off all operating equipment, if possible. Proceed in a quick and orderly manner to the assembly point or safe haven. All injuries and accidents will be dealt with in a manner to minimize continued health risk to site workers: • First aid or other appropriate initial action will be administered by those closest to the accident or injury. This assistance will be provided in a manner that will assure that those performing the activities are not placed at unacceptable risk. • All accidents will be reported to, and documented by, the FPS, who is responsible for coordinating the emergency response actions in an efficient, rapid and safe manner. • Employees will be responsible for conducting themselves in a mature, calm manner in the event of an accident or injury. In the event of an emergency situation, such as fire, explosion, significant release of contaminants, etc., the FPS will notify site personnel and initiate site evacuation procedures. Personnel in all areas will evacuate and assemble in the support zone or other safe area identified by the FPS. Under no circumstances will incoming personnel or visitors be allowed to proceed into the work areas once an emergency has been declared. The FPS will ensure access to emergency equipment and verify that all equipment is shut down. While the safety of all on-site personnel is being confirmed, emergency response teams will be notified of the emergency and other appropriate personnel and agencies will be notified subsequently.

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9.2   First Aid Arrangements

Method of communication	Phone	
Location of first aid kit	In support zone.	
First Aider(s)		

9.3   Fire Safety

Location of fire extinguishers	One for each field vehicle and piece of heavy equipment.
Location of assembly point	Contractor trailer

9.4   Site Emergency

☒Site emergency procedures available

10.0   HSE PLAN CONTROL

It is the responsibility of the Project Manager to ensure that this HaSEP is prepared, and the contents communicated at the pre-start / toolbox meeting to all project staff, Golder or subcontractor, with a copy held on site. The HaSEP has been reviewed or prepared by the Project Manager.

If the project site is remote from the home office, this HaSEP is to be reviewed and approved by the local Golder office whether in another country, province, or city.

Role	Name (printed)	Date	Signature
Prepared by	Eric Adams		
Reviewed by	Ted Norton		
Approved by	Matt Wickham		
Other			

GOLDER
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10.1 Golder Sign-off

Signing below indicates you have read and agree to comply with the information contained in this document.

Date	Name	Company	Signature

GOLDER
MEMBER OF WSP

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Date: May 17, 2022
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APPENDIX A

COVID 19 – BEST PRACTICES

ATTACHMENT TO THE HEALTH AND SAFETY ENVIRONMENT PLAN FOR UPRR TRENTWOOD ALLUMINUM RECYCLING PRE-DESING INVESTIGATION

COVID-19 Readiness, Planning, and Prevention Plan Trentwood WA Aluminum Recycle Dross II

19119180.1000A

August 20, 2020
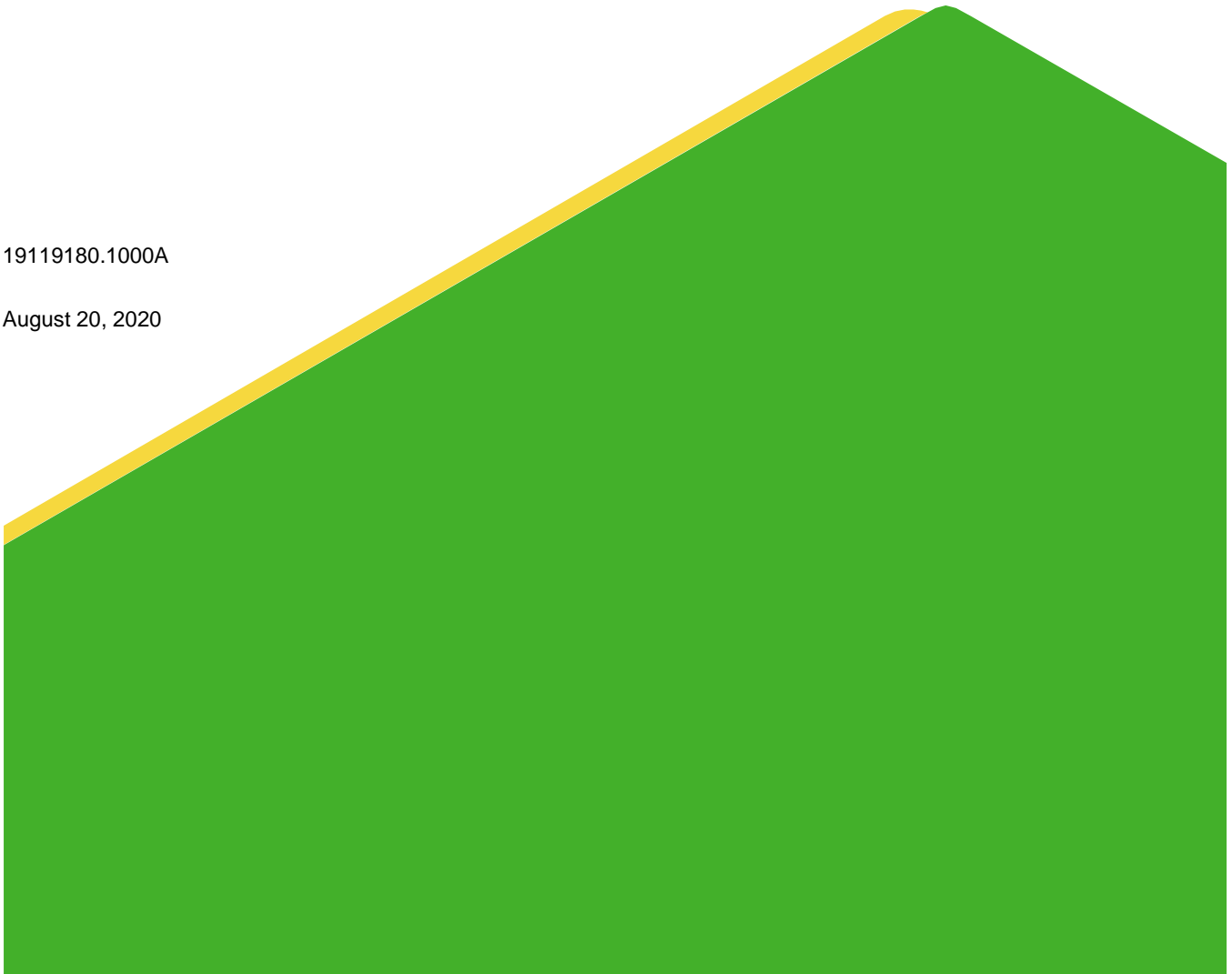
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1.0 INTRODUCTION

This COVID-19 Readiness, Planning, and Prevention Plan (COVID-19 Prevention Plan) outlines the procedures to mitigate the potential spread of COVID-19 while Golder Associates Inc. (Golder) conducts work activities at the Union Pacific Railroad Trentwood WA Aluminum Recycling Dross II project site (Site) as part of the 2020 Pre-design Investigation (PDI). This COVID-19 Prevention Plan is an attachment to the Health, Safety and Environment (HASEP) for the Trentwood PDI (Golder 2020). This document is a living document and will be revised and re-issued based on direction from Golder, state, and federal health authorities, and as conditions evolve and necessitate an update.

COVID-19 is thought to spread mainly from person-to-person contact from people who are within about 6 feet of each other (CDC 2020). The virus spreads through respiratory droplets produced when an infected person who may or may not be showing symptoms coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are nearby and possibly be inhaled into the lungs (CDC 2020). Workers at higher risk for severe illness include older adults and people of any age with certain underlying chronic medical conditions like chronic lung disease, severe obesity, diabetes, or serious heart conditions. The CDC (2020) lists the following potential symptoms of COVID-19:

- Fever or chills (≥ 100.4°F)
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache

- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

1.1 Project Description

The Project will involve personnel from the Golder Redmond, Washington and Portland Oregon offices and Golder subcontractors.

Work during the summer of 2020 the primary field task will be Implementing the pre-design investigation. The field activities associated with implementing the PDI will consist of:

- Conducting an underground utility locate,
- Conducting an XRF survey to estimate metals concentrations in site surface soils,
- Collecting surface soil samples and
- Drilling and sampling approximately 20, 15-foot deep boreholes using a sonic drill rig.

The remainder of this document details steps that will be taken to minimize the potential for COVID-19 to spread between team members, and between team members and the general public.

1.2   State and Federal Regulatory Guidance

Guidelines outlining the measures to mitigation COVID-19 are outlined in publications prepared by the State of Washington and Golder (see Appendix A for the full text of these publications).

Key guidelines that pertain to this work include:

- Businesses should adhere to the following physical distancing and sanitation requirements:

  - maintain at least 6-foot physical distancing from other individuals whenever possible

  - wash hands with soap and water or use hand sanitizer frequently

  - wear face coverings while in public, especially when six-foot distancing is not possible (e.g., inside businesses)

  - stay home if sick

- Gatherings of any size but should adhere to physical distancing and sanitation requirements

Golder has prepared health and safety guidelines and best practices to ensure the continued health, safety, and well-being of personnel working in the field during the COVID-19 pandemic (Appendix A). These components have been incorporated into this plan, as applicable.

2.0 PROJECT SPECIFIC COVID-19 MITIGATION CONTROLS AND PRECAUTIONS

2.1 COVID-19 Health Screening

- All site work personnel must be properly cleared for field work including medical clearance and current in safety and hazardous waste training. Employees with chronic medical conditions are encouraged to discuss risk factors with their doctor to determine if they can safely perform this work as part of a team.

- All workers will be requested to self monitor for COVID-19 symptoms listed in Section 1.0 and in the Appendices for 14 days prior to travelling for the project. Workers will need to be free from symptoms during this period to be eligible to be part of the field crew. A minimum of two signs or symptoms should be used to determine if personnel potentially have COVID-19.

- If a worker has been diagnosed positive for COVID-19 or may have been potentially exposed to COVID-19 in the 14-days prior to or during the Site work, they will be asked to self-isolate for at least 14-days to ensure that they are not symptomatic of COVID-19 and will be replaced by another staff member.

- All site work personnel must not be currently sick, ill, presumptive positive for COVID-19 or experiencing symptoms, including those listed in Section 1.0. Employee or contractors that have a body temperature higher than 100.4°F and or exhibit COVID-19 symptoms must immediately notify their supervisor. Golder employees and subcontractors must check their temperature and monitor for symptoms before departing for work. This daily monitoring will be documented with Golder's COVID-19 Workplace Health Screening (Jot Form; See Appendix B), which will be saved in the project files.

- While at work, Site employees and subcontractors must monitor themselves for any changes in their physical condition that might indicate the onset of COVID-19.

- Any worker that has experienced primary or secondary exposure, has been diagnosed with COVID-19, or is experiencing symptoms of COVID-19 must immediately cease working, notify their supervisor, and self isolate until they are advised otherwise by a healthcare professional.

2.2 COVID-19 Risk at Work Site

The Project work site is located near Trentwood, WA. There are no residents and workers are limited to Golder and our subcontractors at the Project work site. Golder's COVID Prevention Plan will require pre-work and ongoing self-monitoring to establish and maintain adequate protection for the field crew for the duration of the Project. The PPE requirements for mitigating the spread of the COVID-19 virus were established based on the level of risk to Golder field crew and subcontractors whose work may place them in proximity to other employees. The Project work is considered a "Lower Exposure Risk" given that the work will be conducted in a remote outdoor location and the exposure to the public will be minimal. Exposure potential at the Site include Golder employees, Golder's subcontractors, and truck drivers delivering soils to the Site. Specific mitigation measures to address the low risk of COVID-19 infection associated with Site activities are addressed in the following sections.

2.2.1 Project Work

The HASEP (Golder 2020) has been developed to mitigate the risk associated with the Project work and all monitoring activities conduced at the Site. The safety controls implemented have allowed the remediation work conducted thus far to be successfully completed with no incidents. In the current 2020 work environment, Golder COVID-19 guidelines (Appendix A) will be followed to minimize potential exposures. By following the Health

Screening procedures listed in the COVID-19 Prevention Plan, the crew members will help to reduce the risk of COVID-19 transmission.

2.2.2   General Cleaning, Disinfecting, and Hand Hygiene

All crew members will follow Golder's Best Practice Guidance for the mitigation of COVID-19 (Appendix A), and the following items from USEPA's Interim Health and Safety Guidelines, and the CDC's best practices guidance, and which are as follows:

■ Wash hands frequently with soap and water for at least 20 seconds. If soap and water are not available, use an alcohol-based hand sanitizer with a minimum of 60% alcohol.

■ Avoid touching your eyes, nose, and mouth.

■ Avoid close contact with people who are ill. Do not go to work when you are ill.

■ Make available hand sanitizer, PPE, and cleaning supplies; clean and disinfect frequently touched objects and surfaces, including vehicles.

■ Cover your mouth and nose with your bent elbow or tissue when you cough or sneeze. Dispose of the used tissue immediately and wash your hands.

■ Avoid shaking hands, fist bumping, hugging, or kissing when greeting people.

■ Regularly clean high-touch surfaces.

■ Disinfect vehicles (wipe down the steering wheel, door handles, touchpoints) daily.

■ Use soapy water or alcohol based wipes to clean shared equipment (e.g., clip board, pen, cell phone, field meters, handles of coolers, radio), noting that Lysol and Clorox wipes may damage some materials (like rubber, clear screens on phones).

■ Follow social distancing protocols by keeping 6 feet away from others when possible. When social distancing is not possible, don a face mask over your nose and mouth.

Alcohol-based wipes, or hand sanitizer will be available in the vehicles driven to the site. Crew members will wash their hands with soap and water (or hand sanitizer when not available) upon arrival at the Site, prior to taking a break, prior to and after eating lunch, after use of the bathroom, and upon leaving the Site for the day.

Crew members will conduct daily tailgate meetings complete job safety and environment analysis (JSEA) outside and away from public areas, maintaining a 6-foot separation between workers.

While in public spaces, if it is not possible to maintain a 6-foot separation, crew members will wear a face cover consisting of tightly woven material worn snugly, but comfortably over the mouth and nose area. Face coverings can reduce the spread of COVID-19 but are not a replacement for social distancing.

3.0   EMERGENCY RESPONSE PLAN IN CASE OF ILLNESS

The criteria to determine if a crew member working on the Project has potentially been infected with COVID-19 will be as follows: 1) the crew member records a body temperature above 100.4°F; or, 2) acutely displays other symptoms associated with COVID-19. Immediately

If symptoms of COVID-19 develop during the 14-day pre-field symptom monitoring period prior to the employee travelling for the Project, the crew member will self-isolate until asymptomatic and/or until tested and a professional medical diagnosis is obtained. In this situation, an alternate crew member to replace the affected crew member will be assessed depending on the results of the medical diagnosis.

4.0   CLOSURE

Attached to this plan, as appendices, are the detailed guidance documents and the Jot Form to be completed as part of the requirements listed in this plan.

Golder Associates Inc.

Ted Norton
Associate - Senior Consultant

JX/TN/sb

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APPENDIX A

COVID-19 Guidance

Golder Best Practices – COVID-19

Golder COVID-19 In the Field

Golder COVID-19 Field Preparedness Quick
Guide

Golder COVID-19 Field Verification Checklist

GOLDER

Best Practices – COVID-19

This is summary document of our health and safety procedures specific to COVID-19. If you have additional questions not address in our attached document, please contact us and we will answer as quickly and accurately as possible. Additional information and resources are available on GoldNet Incident Management Page.

1.0 PERSONAL HYGIENE

The best way to prevent infection is to avoid being exposed. All employees are directed to follow Best , including:

- Wash your hands frequently with soap and water for at least 20 seconds. If soap and water are not available, use an alcohol-based hand sanitizer with a minimum of 60% alcohol.

- Avoid touching your eyes, nose and mouth.

- Avoid close contact with people who are ill and stay home when you are ill.

- Follow social distancing protocols by keeping 2 meters (6 feet) away from others, don't gather in groups.

- Clean and disinfect frequently touched objects and surfaces

- Cover your mouth and nose with your bent elbow or tissue when you cough or sneeze. Dispose of the used tissue immediately and wash your hands.

- Avoid shaking hands, hugging or kissing when greeting people.

- Be prepared for a potential self-quarantine at home for up to 14 days by being adequately stocked with supplies and medication.

Exposure and Reporting

- All employees are required to report if they have had direct contact with someone who has been diagnosed with the virus within the past 14 days.

- If you have a fever, dry cough or difficulty breathing, notify your supervisor and follow the directions of your medical provider or local health authority.

- Notify your supervisor if you are required to travel for projects and have a medical condition that makes you unusually vulnerable to the virus e.g. an immune deficiency, diabetes (the medical condition need not be disclosed).

2.0 BEST PRACTICES FOR OUR OFFICES

- Maintain physical distance of 2 m while in the office wherever possible.

- Wipe down work surfaces with alcohol wipes at the start of your day including desk, keyboard, armrests, mouse, etc.

- Avoid face-to-face meetings. Instead use the phone, video conferencing and internet to conduct business (even in the same building) as much as possible.

- If a face-to-face meeting is unavoidable, minimize the meeting time, choose a spacious area and sit at least one meter away from each other.

- Bring lunch and eat at desk or away from others

- Don't make drinks or food for other people. Retain and reuse the same cup and spoon for drinks throughout the day

For office visits, consider if your visit is essential or the discussion can be conducted remotely. If the office visit is a must, Golder host will screen the visitor's exposure to COVID-19 by asking:

1) Have you returned from international travel within the last 14 days?

2) If your answer to 1 is yes, what countries did you visit?

3) If your answer to 1 is yes, how long ago did you return?

4) Have you been in direct contact with a person diagnosed as having been infected with COVID 19?

5) Do you currently have any symptoms suggestive of a flu like infection?

If the answers to the above questions indicate a potential exposure, Golder host must seek approval from the Office Manager.

Upon arrival at our office, visitors are requested to adhere to the following hygiene and personal protection measures:

- Sanitize your hands at the entrance station if provided.

- Verbally provide your details to the receptionist for entry into the visitors register rather than writing in yourself

- Sanitize your hands regularly while in the office space.

[Refer to Office Cleaning doc]

3.0 PROJECT FIELDWORK

All planned fieldwork is to be reviewed and, where possible, such work should be carried out without physically going to site. Examples are client meetings which can be carried out online as opposed to face to face.

Where fieldwork at a client site is essential and alternatives are not possible, the project manager shall select the smallest team possible and seek approval through the ARM.

The project manager shall verify that the following considerations have been applied and they are satisfied that controls will be in place for the duration of the on-site scope of work.

Prior to Field Work

Prior to field work, confirm the following with clients, subcontractors and vendors:

- **Review Client COVID 19 site visit policy** and protective measures and confirm they are appropriate to protect Golder staff while at site.

- **Advise the Client of Golder COVID-19 processes and controls.** Confirm field staff (including subcontractors) will self-monitor for COVID-19 and agree process if symptoms are identified.

- **Request the client assist** in enforcing a 2 m social distance between Golder staff and other site occupants.

- **Advise Golder's subcontractor** of our COVID-19 processes and controls. [refer to Subcontractor Operating Guidelines]

- **Confirm site facilities are adequate** to comply with personal and group hygiene requirements.

- **Site travel arrangements** to include how future travel restrictions may impact employee's return from site.

- **Fieldwork shall be carried out without overnight stay where possible**, however this requirement shall be balanced with a consideration of the distance involved, the expected duration of the field work, and Golder's fatigue management requirements.

- **Where an overnight stay is unavoidable**, request the accommodation's COVID 19 management plan and review. Should it be deemed that the measures described are insufficient, such accommodation shall not be used until issues of concern are addressed to Golder's satisfaction.

- **Field staff should be provided with an adequate supply** of a liquid soap, sanitizer gel, sanitizing wipes, disposal gloves, etc. for the full duration of the journey and field work period.

- **Guidance on managing health hazards must be incorporated into the project HSSE planning** (HaSEP/WMS), including notification to supervisor if not feeling well, are coughing or having difficulty breathing.

- **Establish a check-in process** to check fitness for duty of the field staff and provide support.

Travel and Vehicles

ALL business travel requires the approval of a regional manager or business unit leader.

Field personnel should avoid public transit and either use Golder vehicles, a rental vehicle, or their own personal vehicles as dictated by site, route conditions and client requirements.

- Before using a shared or rental vehicle wipe down steering wheels, arm rests, dashboard, handles etc. with disinfecting cleaning wipes.

- When more than one employee is sharing a vehicle, consider having the passenger sit in the opposite back seat to increase the distance.

- Discuss options where people can work alone (where appropriate e.g. ground water work).

- Discuss options for taking more than one vehicle.

On Site

- Site work shall be undertaken maintaining basic social distancing guidelines and basic health care precautions.

- Review the layout of the proposed work area considering the number of bystanders/other workers that may be present and consider whether the controls are sufficient to maintain social distance.

- Where other workers or members of the public may be present in the general work area, provide barricades and signage (e.g. "PLEASE MAINTAIN A 2 METRE SEPARATION DISTANCE") to physically separate the work area.

- Don gloves where appropriate. Don't touch your face with gloves. Wash your hands after removing gloves. Remember that the use of PPE does not replace basic hygiene measures.

- Avoid sharing equipment with other people (notebooks, pens, etc.).

- Use soapy water or alcohol based wipes to clean shared equipment (e.g., clip board, pen, cell phone, field meters, handles of coolers, radio), noting that Lysol and Clorox wipes may damage some materials (like rubber, clear screens on phones).

- During daily pre-start meeting confirm [refer to tailgate template]:

    - Each individual is fit for duty. Ask if anyone is feeling sick and or dealing with flu like symptoms.

    - Social distancing controls.

    - COVID-19 specific PPE available.

    - Personal hygiene requirements and facilities.

- All field staff and subcontractors should conduct daily self-monitoring for potential symptoms. An individual who has symptoms consistent with COVID-19 or suspicion of being in contact with a confirmed case will follow the directions of the Client or local health authority.

Subcontractors

Actions to be incorporated into the Subcontractors scope of work:

- Have been provided with adequate training to recognize COVID-19 symptoms by their employer

- Complete daily self-screening for COVID-19 symptoms (self-assessment tool) before reporting for work

- Do not report for work if they are symptomatic or have had direct contact with a symptomatic individual within the last 14 days.

- Request a copy of, or the location/web address of, any new policies, procedures, and protocols that a subcontractor has implemented regarding COVID-19. Coordinate with your PM and subcontractor coordinator to store this information with your project and/or in the database as applicable.

4.0   OVERNIGHT ACCOMMODATION

Regardless of the type of accommodation consider taking some personal food supplies (energy bars, camping meals, etc.) in case food areas get unexpectedly closed during your visit (e.g. a change to government advice or localised COVID-19 concerns)

Ensure you have sufficient quantities of personal medicines, toiletries etc. as these many be, or become, unavailable at the accommodation location.

Prior to Booking Accommodation

- Consider the type of accommodation. Preference should be given to single occupancy (e.g. Airbnb, apartments) over shared accommodation spaces (e.g. hotels, houses)

- If selecting single occupancy, consider ease and safety of access to local food supplies (grocery stores) if self-cooking is required.

- Where possible, prearrange groceries for the duration of the stay with local staff, clients, or through grocery delivery services.

- Consider staying at accommodation with a kitchenette option to enable cooking food yourself and staying out of restaurants.

- For public accommodation inquire if they have put any enhanced cleaning of rooms and shared spaces.

- For client-provided accommodation confirm the controls in place comply with, or exceed, Golder's COVID-19 controls.

During Accommodation

- Assess cleanliness of hotel rooms on arrival, if you find that it is not clean, bring it to the attention of the hotel manager on duty and have them address your concerns.

- On arrival wipe down room surfaces with alcohol wipes, particularly food preparation areas where applicable

- If in serviced accommodation, request daily room cleaning.

- In hotels consider using room service, take out or meal delivery instead of eating in shared areas, e.g. hotel restaurants

- If there is no choice but to go to a restaurant, diligently practice social distancing as per health authority instruction and keep appropriate distances

- Practice social distancing in communal areas, e.g. reception

- Avoid using communal ablution facilities, instead return to your room

- Avoid buffet meals (commonly breakfast) where multiple people may be handling the same utensils, e.g. food ladles.

5.0   AIR TRAVEL RECOMMENDATIONS

Before undertaking air travel

- Check yourself for symptoms of acute respiratory illness before starting travel and notify your supervisor and stay home if you or someone in your household is sick or experiencing fever, dry cough or shortness of breath.

- Install the International SOS mobile assistance application to monitor for location-based alerts.

- Check for the latest guidance and recommendations for each location to which you will travel.

- People with chronic disease such as diabetes, heart, renal or chronic lung disease are at much higher risk of mortality if they contract COVID-19. Additional precautions must be taken by employees in this population.

- Pack hand sanitizer and disinfectant wipes.

- Ensure proper travel insurance coverage in case flights are canceled or modified.

Prior to boarding your flight

- Maintain a minimum distance of 2 m from other people at airports as much as possible.

- Avoid touching any surface (counter, doors, conveyor belt trays, etc.). If you do touch them, wash your hands after.

- Wearing a mask is optional, however if you choose to wear a mask:

  - Do not remove it at any time once you have put it on (neither inside the airport nor inside the plane). This includes the temporary withdrawal to eat drinks or food.

  - Wash or disinfect your hands before removing the mask.

  - The mask must be disposed of immediately in a proper manner.

  - Wash or disinfect your hands again

While on board

- Sit at least 2 seats apart in each direction, if possible.

- Wipe down all surfaces on which you will maintain contact during the trip. Use alcohol-based wipes to clean tray table, armrest, screen, window, etc.

- Dispose of dirty wipes in a sealable bag as soon as possible.

- Wash or disinfect your hands after cleaning surfaces.

- If you use the toilet, do it normally remembering to wash your hands.

- Once the flight is finished, apply the same controls as prior to boarding.

Upon arrival at destination

- At the end of your flight, follow the guidance from health authorities to identify suspected cases of COVID-19 infection.

- Upon arrival at your destination, disinfect your hands, avoid contact with objects, remove your clothes and put them to wash.

- Self-monitor for 14 days after the trip to identify any possible symptoms.

- If during this time there are no symptoms, you can resume normal activities.

- If you have any symptoms, self-isolate, notify your supervisor and contact health services for guidance.

6.0   WORKING FROM HOME

The following resources are available to help you stay healthy and be productive when working at home.

- How to work outside the office
- Ergonomic set up for working at home.
- Ergonomic Stretches
- Stay at Home. Stay Productive
- VDU/DSE Self Assessment

COVID-19 in the Field

GOLDER

THIS TIP SHEET IS INTENDED AS A GENERAL GUIDELINE TO OUR PEOPLE IN THE FIELD. IF YOU NEED ADDITIONAL INFORMATION OR HAVE QUESTIONS, SPEAK TO YOUR SUPERVISOR.

As we continue our field work, remember to consider your COVID-19 risks and controls, as you would for potential exposure to other contaminants. How you implement these controls on site may vary, so it is important to **PLAN AHEAD**.

RISKS AND CONTROLS

Do not come to work sick.
In the field: Monitor your health in the morning and more frequently as necessary. If you have cold or flu-like symptoms stay home. COVID-19 symptoms can include fever, cough, shortness of breath.

Wash your hands frequently.
In the field: Verify you have restroom access with clean water and soap. If you do not, bring jugs of water to the field and a bottle of soap. Use a jug with a dispenser tap or ask a buddy to help pour the water to rinse your hands.

Avoid touching your eyes, nose, and mouth.
In the field: Wear safety glasses to keep you from touching your eyes. Be diligent about reminding yourself and colleagues. If you see someone doing it, kindly remind them not to.

Avoid shaking hands when greeting people.
In the field: Just don't do it.

Cover your mouth and nose with your bent elbow or tissue when you cough or sneeze.
In the field: Include a box of tissues in your field supplies. Dispose of used tissue immediately and wash/sanitize hands.

Plan for additional PPE.
In the field: Additional PPE may be needed, depending on your tasks and risk of exposure. For example, wear gloves when pumping gas or when you need to touch common surfaces. Change gloves as needed to prevent cross-contamination with clean surfaces.
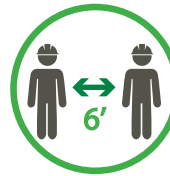
Practice social distancing.
In the field: Hold multiple JSEA tailgate meetings to keep the number of participants down, hold outside in a larger area and space people out. Use a megaphone (disinfect before and after use) or other means to project your voice so all can hear. Modify tasks to limit the number of people required at any one time. Use cell phones for communication. Avoid site common areas. If possible, avoid group meetings and offices where close proximity with others becomes unavoidable.
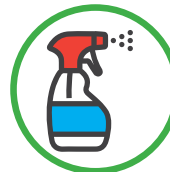
Perform routine environmental cleaning.
In the field: Ensure of an adequate supply of liquid soap, sanitizer gel, and sanitizing wipes for the full duration of the journey and field work period. Routinely clean all frequently touched surfaces in the field, such as shared field equipment, countertops, doorknobs, and vehicle components.

Plan for the unexpected.
In the field: Ensure an adequate supply of food and bottled water for the intended fieldwork duration **plus a buffer** in the event that circumstances delay your return. Many stores and restaurants are closing, so be prepared. Additionally, having your own supply will limit your interaction with other people in public by eliminating the need to go to the store or local restaurant.

BEFORE COMMENCING FIELD WORK, CHECK WITH YOUR CLIENT ON ANY ADDITIONAL RESTRICTIONS

RISKS AND CONTROLS

Integrate your COVID controls into our HSSE risk tools.

JSEA: Fitness For Duty, as pertains to fatigue management and health, of all workers must be confirmed daily during the morning and post-lunch safety meetings. During your tailgate discussions, please ask if anyone is sick or just not feeling 100% today and remind staff of the importance of Stopping Work and letting someone know if they start to feel unwell. Additionally, during your meeting, discuss the appropriate COVID-19 controls that will be implemented during field activities.

Take 5 Discussions

Include confirmation that everyone is Fit for Duty in your Take 5 conversations. Pay attention to your co-workers and if you notice someone seems out of breath, is struggling to keep up pace, or just seems to be having difficulty managing the terrain, Stop Work and re-assess the worker's fit for duty for that task.

Subcontractors

- Verify that they are provided with adequate training to recognize COVID-19 symptoms

- Request that they complete daily self-screening for COVID-19 symptoms (self-assessment tool) before reporting for work

- Request that they do not report for work if they are symptomatic

- Include them in your JSEA discussion, so they are informed of Golder's COVID-19 controls

Overnight accommodations:

In the field:

- Consider the type of accommodation. Preference should be given to single occupancy, e.g., Airbnb, apartments, over shared accommodation spaces like hotels.

- Call ahead to confirm that there are controls in place that meet or exceed Golder's COVID-19 controls.

- On arrival, wipe down room surfaces with sanitizing wipes, particularly food preparation areas where applicable.

- If in a serviced accommodation, request limited room cleaning to limit contact with other people. Be prepared to clean your own room.

- In hotels, consider using room service instead of eating in shared areas, like hotel restaurants.

- Practice social distancing in communal areas such as reception.

- Avoid buffet meals (commonly breakfast) where multiple people may be handling the same serving utensils.

- Regardless of the type of accommodation, consider taking some personal food supplies (energy bars, camping meals, etc.) in case food areas get unexpectedly closed during your visit (e.g., a change to gov't advice or localized COVID-19 concerns).

- Ensure you have sufficient quantities of personal medicines, toiletries, etc. as these may be, or become, unavailable at the accommodation location.

WHEN IN ANY DOUBT ABOUT YOUR SAFETY OR THE SAFETY OF THOSE AROUND YOU, STOP WORKING, ISOLATE YOURSELF FROM THOSE AROUND YOU, AND CONTACT YOUR PROJECT MANAGER, HSSE LEAD, OR CLIENT CONTACT FOR GUIDANCE.

Proposed Checklist

When packing/prepping for work in the field, consider adding these items to your existing list:

- ❑ water to wash hands
- ❑ soap
- ❑ gloves
- ❑ hand sanitizer
- ❑ tissues
- ❑ sanitizing wipes

- ❑ thermometer
- ❑ additional food and water
- ❑ clear sandwich bag to put your phone in to keep clean during use
- ❑ Additional PPE (e.g., respirator, tyvec) as needed

Visit Golder's Incident Management SharePoint page for additional information.

COVID-19 FIELD PREPAREDNESS QUICK GUIDE

GOLDER

Prior to Site Work

- ☐ Client/Site specific COVID-19 protocols received/reviewed
- ☐ Provide Golder COVID-19 Protocols to client (if appropriate)
- ☐ Communicate Client & Golder COVID19 protocols to staff and subcontractors
- ☐ Confirm staff and subcontractors willing to self-monitor; consider providing self-assessment forms

Travel

- ☐ All business travel requires the approval of a regional manager or business unit leader.
- ☐ Call ahead to confirm COVID-19 protocols are in place at overnight accommodations
- ☐ JMP completed for all staff
- ☐ Travel booked through HRG
- ☐ International SOS installed and being used
- ☐ Ensure staff have sufficient quantities of personal items (medicines, toiletries, etc.) in case they are not available at project location.
- ☐ Obtain copy of Critical Work Access Letter from client for staff when traveling (if available)
- ☐ Determine if a letter from Golder is needed stating that we are completing essential work when traveling based on state and provincial mandates in the areas where they will be working and traveling through. (BUL to facilitate)
- ☐ Have current Golder business cards on hand

Subcontractors

- ☐ Confirm they have been provided with adequate training to recognize COVID-19 symptoms by their employer
- ☐ Request a copy of their COVID-19 Management Plan
- ☐ Request they complete daily self-screening for COVID-19 symptoms before reporting to work
- ☐ Request that they do not report to work if they are symptomatic
- ☐ Include them in your JSEA discussions so that they are informed of Golder's COVID-19 controls
- ☐ Provide a copy of client/site specific and Golder COVID-19 protocols
- ☐ If needed, verify sub staff have a Critical Work Access Letter when traveling (should be provided by their company, we can provide Golder letter as an example if needed)

PPE/Personal Items/Additional Field Considerations

- ☐ Soap
- ☐ Water to wash hands (include a container to hold and dispense it from if no facilities nearby)
- ☐ Extra nitrile gloves
- ☐ Hand sanitizer
- ☐ Tissues
- ☐ Sanitizing Wipes
- ☐ Disinfectant cleaners/paper towels
- ☐ Thermometer
- ☐ Additional food and water
- ☐ Additional PPE (ie. Respirator, medical mask, Tyvek, face covering etc.) as needed

COVID-19 FIELD PREPAREDNESS QUICK GUIDE

GOLDER

Updates to Risk Management Tools

☐ **JSEA:** Fitness For Duty of all workers must be confirmed daily during the morning and post-lunch safety meetings and before leaving the site at the end of day wrap up meeting. Review the contents in the Golder COVID-19 HSSE Field Work Tip Sheet during the JSEA/tailgate meeting.

☐ **Work Method Statements:** Include task specific details on mitigations for cleaning/disinfecting and social distancing protocols. Examples include: If you are not feeling well, are coughing or having difficulty breathing, Stop Work, inform the Site Supervisor and consider seeking medical care.   If you will not have access to washroom facilities, make sure to have personal hygiene supplies included as part of your standard PPE (hand sanitizer, antibacterial wipes). Wipe down rental equipment, including technical equipment/tools used in the field as well as the interior touch points in rental vehicles such as seats, steering wheels, door handles and other hard surfaces.

☐ **Take 5 Discussions:** Include confirmation that everyone is Fit for Duty. Remind staff about social distancing and discuss how that will be accomplished while completing the task. Discuss and cleaning/disinfecting that will be required for the activity and who will be responsible for that. Pay attention to your co-workers and if you notice someone seems out of breath, is struggling to keep up pace or just seems to be having difficulty managing the terrain, Stop Work and re-assess the worker's Fit For Duty for that task.

☐ **Site Specific HASEP:** Consider adding COVID-19 addendum to existing site specific HASEP, and that it has been reviewed and understood by all staff (including subcontractors). Have field team sign off on the acknowledgement page.

GOLDER

COVID-19 FIELD VERIFICATION CHECKLIST

PROJECT: _____   **DATE:** _____

INSPECTOR: _____   **LOCATION:** _____

Field COVID-19 Guideline	Y / N	Comments
There is a screening process in place that meets local and client requirements for COVID-19.		
A check-in process has been established to check fitness for duty of the field staff.		
All field staff and subcontractors conduct daily self-monitoring for potential symptoms.		
All field staff and subcontractors know what to do if they have symptoms consistent with COVID-19 or suspicion of being in contact with a confirmed case.		
All employees are maintaining physical distance of 6 ft while onsite.		
Golder's subcontractors have been advised of our COVID-19 processes and controls.		
Adequate hygiene facilities are available to comply with personal and group hygiene requirements.		
Sufficient hygiene materials (hand sanitizer, soap, disinfectants, etc.) are readily available.		
Site travel arrangements have been made with consideration to travel restrictions that may impact employee's return from site.		
Guidance on managing health hazards have been incorporated into the project HSSE planning (HaSEP/WMS), including notification to supervisor if not feeling well, are coughing, or having difficulty breathing.		
Shared field vehicles are wiped down before each use.		
Equipment and tools are not shared with other people (notebooks, pens, etc.) or are cleaned before sharing with others.		
Physical distancing has been considered for site travel e.g. passenger sitting in opposite back seat, face covering, etc.		
The layout of the work area is sufficient to maintain social distance.		
Where required, accommodation been arranged with sufficient measures to prevent the spread of COVID19 e.g. single occupancy, kitchenette available, enhanced cleaning.		
Other site-specific requirements:		

APPENDIX B

JOB SAFETY & ENVIRONMENT ANALYSIS FORM

GOLDER
MEMBER OF WSP

32/35

Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood HASP
2020 RA-05172022

GOLDER
MEMBER OF WSP

JOB SAFETY & ENVIRONMENT ANALYSIS

Date: _____ **Time:** _____

Project No: _____

Site: _____

🦠 COVID-19 CONSIDERATIONS

- Physical distance of 2m (6 feet) to be maintained.
- Practice frequently hand cleaning (alcohol-based sanitizer or soap and water).
- If physical distancing cannot be maintained ensure you are wearing a mask.

IF YES TO ANY, REPORT TO SUPERVISOR	Y	N
▪ Had direct contact with someone who has been diagnosed with having been infected with Covid-19?	☐	☐
▪ Have any symptoms consistent with a common cold, flu, or the virus?	☐	☐
▪ Returned from international travel within the last 14 days?	☐	☐

FIT FOR DUTY

	Y	N
▪ All workers on site are able to confirm they are fit for work?	☐	☐
▪ Do all workers know the physical requirements of their tasks today?	☐	☐
▪ Does any worker report concern or have any pre-existing conditions that may be aggravated by this work? If yes, please contact your supervisor before proceeding.	☐	☐

Contact your supervisor ASAP if you feel any pain or strain, no matter how minor and call **WorkCare** (+1-888-449-7787)

You have the right to refuse, and authority to stop, work if you:
- Believe a HSSE risk is not adequately controlled.
- Are unsure of the way to manage risk.
- Do not hold the necessary competency to manage the risk.

1 STOP

STOP AND ASSESS:	Y	NA
Planning		
▪ HSSE Plan communicated to Employees?	☐	☐
▪ Employees signed on to Work Method Statements?	☐	☐
▪ Required Permits to Work issued?	☐	☐
Preparation		
▪ Employees fit for duty and not showing signs of fatigue?	☐	☐
▪ Work not expected to exceed the fatigue requirements?	☐	☐
▪ Required site inductions completed?	☐	☐
▪ Employees hold the necessary competencies?	☐	☐
▪ Employees have the required PPE?	☐	☐
▪ Plant/equip/tools in good repair (incl. guarding & E stop)?	☐	☐
Site		
▪ GPS coordinates verified against technical instruction / map?	☐	☐
▪ Service clearance completed?	☐	☐
▪ Current hardcopy digging clearance plans available on site?	☐	☐
▪ Pre-work photographs taken?	☐	☐
▪ Work area adequately delineated / protected?	☐	☐
▪ Traffic control plan implemented (if applicable)?	☐	☐
▪ Emergency and spill response equipment accessible?	☐	☐
Environment & Heritage		
▪ Equipment free of visible weeds and pests?	☐	☐
▪ Waste / substances stored away from sensitive receptors?	☐	☐
▪ Secondary containment for substances / liquid waste?	☐	☐
▪ Erosion and sediment controls installed?	☐	☐
▪ Sensitive receptors protected from damage / disturbance?	☐	☐
▪ Heritage items / artefacts protected from disturbance?	☐	☐
▪ Plant inspected for evidence of fluid leaks & excess exhaust?	☐	☐

2 THINK

DISCUSS THE TASK AND THE WORK ENVIRONMENT:

- Daily Tasks
- Site Conditions
- Weather Forecast
- Equipment, Material & Logistical Issues
- Interfacing Works / Simultaneous Operations

NO JOB IS SO URGENT THAT WE CANNOT MEET OUR HSSE RESPONSIBILITIES.

3 IDENTIFY

ARE ANY FATAL RISK CONTROLS PRESENT?	Y	N
Working Around Heavy / Mobile Equipment	☐	☐
▪ Be visible and identify your safe spot.		
▪ Do not enter the zone of influence of mobile equipment until you have positive OK.		
Driving	☐	☐
▪ Always wear a seatbelt.		
▪ Respect the road rules, drive at a speed appropriate to the conditions.		
▪ Do not use your cell phone.		
▪ Do not drive after 14 hours or legislated hours.		
Acutely Hazardous Substances / Atmospheres	☐	☐
▪ Know what you are working with.		
▪ Know the environments in which you are working.		
▪ Do not enter a confined and/or restricted space without understanding and following the required entry procedures.		
Working At Heights	☐	☐
▪ Where fall potential has been identified, use fall prevention measures against falls.		
▪ Do not stand within 2m (6.5ft) of an open edge where there is the potential to fall greater than 1.8m (6ft) without approved fall protection.		
Working Around Suspended Loads	☐	☐
▪ Do not pass under a suspended load.		
▪ Remain at a safe distance from a suspended load.		
Ground Stability	☐	☐
▪ Do not enter an unsupported excavation that is deeper than your waist.		
▪ Scan continuously for signs of ground instability.		
▪ Avoid entering areas of unsupported ground.		
Are there any other factors, not already covered in Work Method Statements, which could result in injury, illness, environmental harm or property damage?	☐	☐

If yes, record hazard & controls in Section 4

4 **PLAN –** **Plan what needs to be done to manage the risk**

Hazards List any hazards not already identified in WMS	Risk Control Measures List the control measures required to eliminate or minimize the risk arising from the identified hazards. If risks cannot be controlled STOP and notify your Project Manager. Update the HSSE Plan and/or WMS if necessary.

Attendee	Signature	Attendee	Signature	Attendee	Signature

5 **PROCEED –** **Communicate and implement risk controls**

Site Closure Checklist

Equipment and materials removed or secured? ☐

Waste collected and removed or securely stored and labelled? ☐

Site restored to original condition, if required? ☐

Area free from hazards created by the works? ☐

Photographs taken of site on completion of works? ☐

Supervisor:	Completed by:

Learnings: *Ensure all Learnings are recorded in iSMS as soon as possible.*

APPENDIX C
DIRECTIONS TO NEAREST HOSPITAL

GOLDER
MEMBER OF WSP

33/35

Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood HASP
2020 RA-05172022
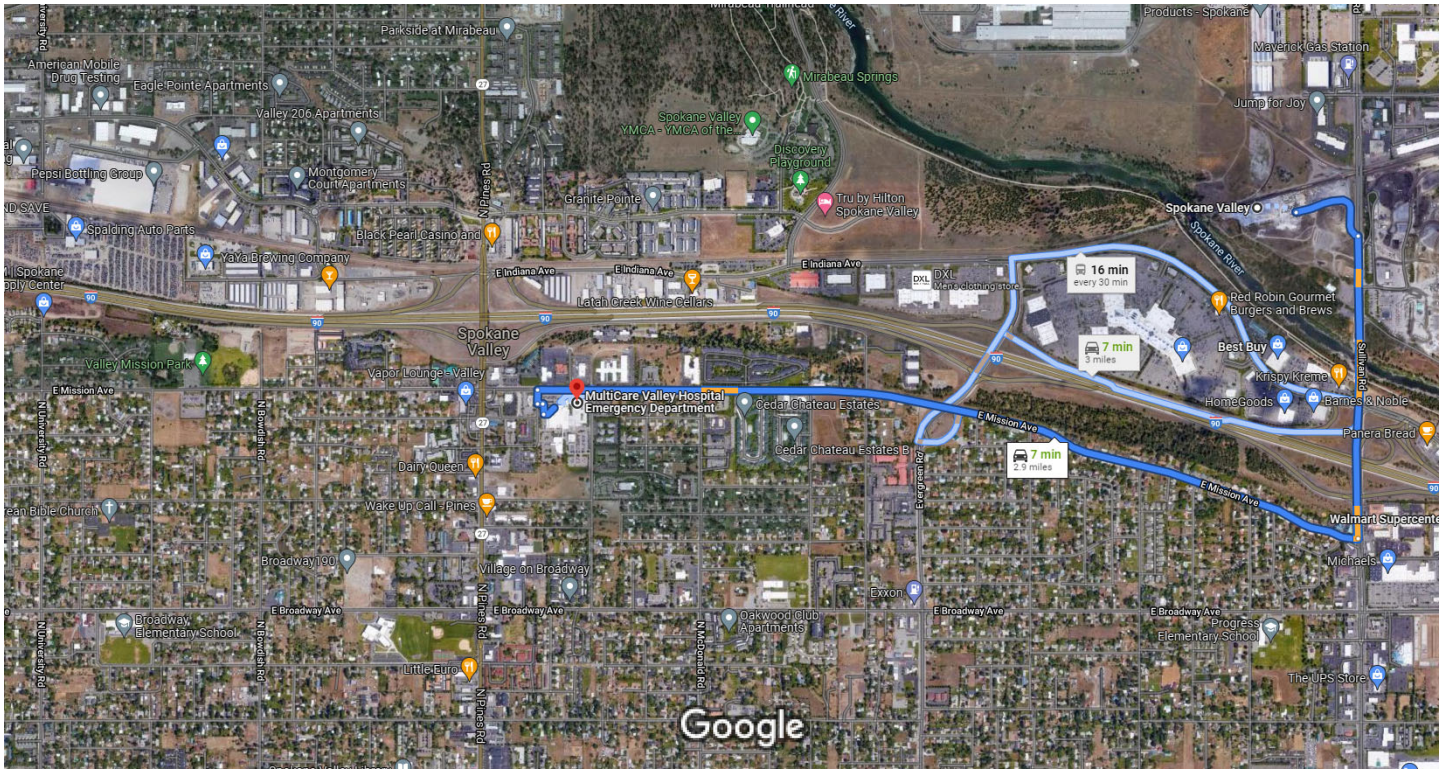
Imagery ©2021 CNES / Airbus, Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2021   1000 ft

Spokane Valley

Washington

↑	1.	Head east toward Sullivan Rd	
			0.2 mi
↱	2.	Turn right onto Sullivan Rd	
			0.7 mi
↱	3.	Turn right onto E Mission Ave	
			1.9 mi
↰	4.	Turn left onto N Houk Rd	
			164 ft
↰	5.	Turn left	
			66 ft
↱	6.	Turn right	
			131 ft
↰	7.	Turn left at the 1st cross street	
			151 ft

MultiCare Valley Hospital Emergency Department

12606 E Mission Ave, Spokane Valley, WA 99216

APPENDIX D
STANDARD WORK PROCEDURES
(FIELD COPY ONLY)

GOLDER
MEMBER OF WSP

34/35

Date: May 17, 2022
Project No: 19119180
Filename: 19119180-Trentwood HASP
2020 RA-05172022

APPENDIX E
DUST MONITORING PLAN

1.0 INTRODUCTION

The purpose of this dust monitoring plan is to provide the procedures and methods to minimize dust exposure and protect Site personnel and adjacent areas and properties during implementation of the Union Pacific Railroad (UPRR) remedial action construction activities for Aluminum Dross Recycling Trentwood project located on North Sullivan Road in Spokane Valley, Washington (the Site).

The primary objectives of project dust monitoring are to:

1) Monitor dust for the protection of the Site personnel and minimize exposures to Site Constituents of Concern (COCs) during activities with the greatest potential to generate dust.

2) Evaluate the adequacy of dust control measures applied during soil-disturbing activities to minimize the potential for fugitive dust to impact adjacent unimpacted areas or properties.

The main components necessary to achieve these objectives are listed below:

- Identify Site COCs

- Identify site activities that will potentially present exposures of Site personnel and adjacent properties and define action levels.

- Conduct dust monitoring activities for the protection of Site personnel and adjacent properties.

- Outline a notification process in the event an action level is exceeded.

- Assess effectiveness of dust control measures.

- Communicate monitoring data to Site personnel and project administrators.

The on-site real-time dust monitoring will be conducted by the Site health and safety officer or designated Site team member, with oversight by a Golder Certified Industrial Hygienist (CIH).

1.1 Site Constituents of Concern

The Site soil COCs associated with stockpile dross materials were identified as arsenic, aluminum, barium, total chromium, copper, and mercury by the Washington State Department of Ecology (Ecology) in the Corrective Action Plan Aluminum Recycling Trentwood Site Spokane, WA (Ecology 2021).

1.2 Potential Dust Generating Site Activities

Activities with the highest potential to subject Site personnel to dust exposure have been identified as: conducting and monitoring Site construction activities and conducting confirmation soil sampling. Site construction activities that will likely present the highest potential to subject adjacent properties to fugitive dust are grading, excavation, loading, and Site truck traffic.

1.3 Site Worker and Perimeter Action Levels

Protection of Site personnel and adjacent properties will be accomplished through dust monitoring using a real-time vapor/particulate air sampling meter (dust meter) during various soil-disturbing activities and confirmatory sampling tasks. The action level for protection of Site workers was calculated using the Dust Exposure Calculation Worksheet provided as Attachment A. The action level for Site workers is based on the approximate

cumulative exposure limit of all Site COCs combined. Table 1 provides action levels for the protection of Site workers and protection of adjacent property (perimeter action levels).

Table 1: Dust monitoring Action Levels

Type of Monitoring	Site Action Level Total Particulate	Monitoring Frequency
Site Worker	8 mg/m^3 (1-minute TWA)*	Hourly during soil disturbance activities
Perimeter	1 mg/m^3 (5-minute TWA)*	Twice daily

mg/m^3 : milligrams per cubic meter of air
TWA: time-weighted average
Temporarily suspend work until controls are sufficient to bring the measured concentration below the action level(s).

If an action level based on time weighted average (TWA) intervals identified in Table 1 is exceeded, a confirmational measurement will be collected on a 15-minute TWA.

The Occupational Safety and Health Administration (OSHA) mandates specific requirements and Permissible Exposure Limits (PELs) for inorganic arsenic exposures in accordance with 29 Code of Federal Regulations (CFR) Part 1910.1018. Dust monitoring results for inorganic arsenic will be evaluated compared to these standards.

Perimeter and personnel dust monitoring that results in airborne concentrations above the action levels provided in Table 1 will require temporary suspension of the monitored activity until controls are sufficient to bring the measured concentrations below the applicable action level(s).

2.0   EXCEEDANCE NOTIFICATION

This section outlines the notification processes for instances when air monitoring levels meet or exceed the action levels provided in Table 1 for Site worker or perimeter monitoring. The Site worker and perimeter action levels have been established to ensure airborne particulate levels of COCs are maintained below applicable occupational exposure limits. If Site worker or perimeter dust monitoring exceed the action levels outlined in Table 1, work will be temporarily suspended until dust suppression efforts are reassessed as acceptable. Work can continue when the following conditions are met: 1) the health and safety office has reassessed the dust suppression efforts; 2) the health and safety officer has completed a safety review showing these efforts are acceptable; and 3) the work area particulate field measurements are below their applicable action levels.

Site personnel will routinely obtain monitoring information using real-time particulate measurements in active soil disturbance activities on a minimum hourly basis during each workday. When readings exceed the established action levels, Site personnel will promptly inform the Site health and safety officer. The Site health and safety officer, in coordination with the field team leader, will reassess the field conditions and determine if addition actions need to be adopted to reduce dust exposure. If there are continual exceedances, the CIH will be consulted and the Site dust mitigation measure will be re-evaluated. Any CIH recommendations will be implemented in the field under a field change request and Ecology approval.

3.0   SITE WORKER PROTECTION AND PERIMETER MONITORING METHODOLOGY

The Site worker dust monitoring program is designed to monitor exposures of workers performing soil-disturbing activities at the Site. This monitoring program is designed to verify compliance with applicable OSHA regulations and to ensure workers are protected from airborne particulate exposures during Site activities. The Site worker dust monitoring program will use real-time particulate measurements over the duration of the Site activities.

Site personnel will obtain daily measurements during activities with the potential to create dust. Site personnel will use dust monitor (TSI DustTrak II Model 8532 or equivalent) to provide real-time measurements of total airborne particulate levels during monitoring. The data collected will be used to evaluate the effectiveness of dust controls being implemented during activities and to ensure airborne particulate levels remain below the designated action levels (Table 1).

The handheld dust meter is equipped with a light-scattering laser photometer that provides near real-time aerosol mass reading. To account for short-term variations in dust emissions, the aerosol monitor will be programmed to capture one-minute intervals for Site worker protection and five-minute intervals for perimeter monitoring that provide the average dust concentration over the respective time interval or will be ran continuously in a subject location. For continuously run applications, Site personnel will check the data readout on the dust monitor and record the minimum, maximum, and average concentrations every 1 to 2 hours and determine if the average concentration has exceeded the action level. The monitoring requirement outlined in Table 1 above may be reduced as data is compiled and it shows that the risk of action levels is negligible. The monitoring requirement will not be reduced without consultation with a CIH. Field measurement will be recorded on field forms. Monitoring data may be downloaded as applicable and saved as an electronic file.

4.0   CALIBRATION AND MAINTENANCE

The TSI DustTrak II Model 8532 (or equivalent) will be maintained and calibrated in accordance with specifications in the owner's manual.

Prior to the start of intrusive activities, background air monitoring using the dust monitor will be performed. Background monitoring will involve obtaining measurements for each work area through hand-held instantaneous measurements for the device. In general, calibration and maintenance will consist of the following:

- The dust meter will be zero-calibrated daily prior to use.

- The 2.5 (micrometer) µm calibration impactor will be cleaned daily prior to use.

- The inlet will be cleaned every 350 hours at 1 milligram per cubic meter (mg/m3) drawn into the meter.

- The internal filters will be replaced every 350 hours at 1 mg/m3 drawn into the meter.

The manual for the TSI DustTrak II Model 8532 is provided in Attachment B to this work plan.

GOLDER
MEMBER OF WSP

ATTACHMENT A

Dust Exposure Calculation
Worksheet

DUST EXPOSURE CALCULATION WORKSHEET - Trentwood				
DustLevel		**Safety Factor for this site = 3**		
Chemical	**Exposure Limit (mg/m3)**	**Maximum Soil Concentration (mg/kg)**	**Exposure Limit Based on Single Compound (EL Mix, mg/m3)**	**Dust Quotient for Each Compound (level/limit)**
Aluminum	5	121,000	13.77	2.42E+04
Arsenic	0.01	16	208.33	1.60E+03
Barium	0.5	381	437.45	7.62E+02
Chromium	0.5	172	968.99	3.44E+02
Copper	1	1,460	228.31	1.46E+03
Mercury	0.025	5.	1,666.67	2.00E+02
			Sum	**2.86E+04**
Dust Mixture Exposure Level at PEL (mg/m3) =			**11.669**	

EQUATIONS USED IN THIS CALCULATION

Dust action level =
(For one dust)

$$\text{Dust action level} = \frac{(1E+6)(\text{Exposure Limit mg/m3})}{(\text{Concentration mg/kg})(\text{Safety Factor})}$$

Dust action level =
(For mixed dusts)

$$\text{Dust action level} = \frac{(1E+6) / (\text{Safety Factor})}{\text{Sum of } [(\text{Concentration mg/kg}) / (\text{Exposure Limit})]}$$

GOLDER
MEMBER OF WSP

ATTACHMENT B

TSI DustTrak II Model 8532

DUSTTRAK™ II
AEROSOL MONITOR
MODEL 8530/8530EP/8532

OPERATION AND SERVICE MANUAL

DustTrak™ II 8530 Desktop and 8532 Handheld Monitors

DustTrak™ II 8530EP Monitor

START SEEING THE
BENEFITS OF
REGISTERING TODAY!

Thank you for your TSI instrument purchase. Occasionally, TSI releases information on software updates, product enhancements and new products. By registering your instrument, TSI will be able to send this important information to you.

http://register.tsi.com

As part of the registration process, you will be asked for your comments on TSI products and services. TSI's customer feedback program gives customers like you a way to tell us how we are doing.

TSI. UNDERSTANDING, ACCELERATED

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France	**Tel:** +33 1 41 19 21 99	Singapore	**Tel:** +65 6595 6388
Germany	**Tel:** +49 241 523030		

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Address

TSI Incorporated / 500 Cardigan Road / Shoreview, MN 55126 / USA

Fax No.

(651) 490-3824

Limitation of Warranty and Liability (effective April 2014)

(For country-specific terms and conditions outside of the USA, please visit www.tsi.com.)

Seller warrants the goods, excluding software sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for twenty-four (24) months, or if less, the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions and exceptions:

a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment;

b. DustTrak internal pump for Models 8530 and 8533 is warranted for two (2) years or 4000 hours, whichever comes first;

c. DustTrak external pump for Models 8530EP and 8533EP is warranted for two (2) years or 8760 hours, whichever comes first;

d. DustTrak internal pump for Models 8530 and 8533 is warranted for operation within ambient temperatures between 5–45°C. Warranty is void when the internal pump is operating outside of this temperature range;

e. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment;

f. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies;

g. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;

h. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;

i. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is **IN LIEU OF** all other warranties and is subject to the **LIMITATIONS** stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE**. **WITH RESPECT TO SELLER'S BREACH OF THE IMPLIED WARRANTY AGAINST INFRINGEMENT, SAID WARRANTY IS LIMITED TO CLAIMS OF DIRECT INFRINGEMENT AND EXCLUDES CLAIMS OF CONTRIBUTORY OR INDUCED INFRINGEMENTS. BUYER'S EXCLUSIVE REMEDY SHALL BE THE RETURN OF THE PURCHASE PRICE DISCOUNTED FOR REASONABLE WEAR AND TEAR OR AT SELLER'S OPTION REPLACEMENT OF THE GOODS WITH NON-INFRINGING GOODS.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN THE CASE OF SOFTWARE, SELLER WILL REPAIR OR REPLACE DEFECTIVE SOFTWARE OR IF UNABLE TO DO SO, WILL REFUND THE PURCHASE PRICE OF THE SOFTWARE. IN NO EVENT SHALL SELLER BE LIABLE FOR LOST PROFITS, BUSINESS INTERRUPTION OR ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI's Customer Service department at (800) 680-1220 (USA) or (001 651) 490-2860 (International) or visit www.tsi.com.

Trademarks

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CONTENTS

These Application Notes can also be found on TSI® Incorporated's web site:
http://www.tsi.com

EXPMN-001 DustTrak II Theory of Operation.pdf
EXPMN-003 DustTrak II Impactor.pdf

Safety Information

<table>
<tr><td align="center">**I M P O R T A N T**</td></tr>
<tr><td>There are no user serviceable parts inside the instrument. Refer all repair and maintenance to a qualified factory-authorized technician. All maintenance and repair information in this manual is included for use by a qualified factory-authorized technician.</td></tr>
</table>

Laser Safety

- The Model 8530/8532 DustTrak™ II monitor is a Class I laser-based instrument.

- During normal operation, you will *not* be exposed to laser radiation.

- Precaution should be taken to avoid exposure to hazardous radiation in the form of intense, focused, visible light.

- Exposure to this light may cause blindness.

Take these precautions:

- **DO NOT** remove any parts from the DustTrak™ II monitor unless you are specifically told to do so in this manual

- **DO NOT** remove the housing or covers. There are no serviceable components inside the housing.

<table>
<tr><td align="center">**W A R N I N G**</td></tr>
<tr><td>The use of controls, adjustments, or procedures other than those specified in this manual may result in exposure to hazardous optical radiation.</td></tr>
</table>

<table>
<tr><td align="center">**W A R N I N G**</td></tr>
<tr><td>There are no user-serviceable parts inside this instrument. The instrument should only be opened by TSI® or a TSI® approved service technician.</td></tr>
</table>

<table>
<tr><td align="center">**W A R N I N G**</td></tr>
<tr><td>If the DustTrak™ monitor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.</td></tr>
</table>

When operated according to the manufacturer's instruction, this device is a Class I laser product as defined by U.S. Department of Health and Human Services standards under the Radiation Control for Health and Safety Act of 1968. A certification and identification label like the one shown below is affixed to each instrument.

Labels

Advisory labels and identification labels are attached to the instrument.

1. Serial Number Label (bottom)	DUSTTRAK™ II – Model 8530 SN 8530105101 MFD DECEMBER 2010 CLASS I LASER PRODUCT COMPLIES WITH 21 CFR 1040.10 AND 1040.11 TSI Inc. 500 Cardigan Road Shoreview, MN 55126 U.S.A. www.tsi.com ⎓ 24V – 2.5A Made in USA
2. Laser Radiation Label (internal)	**DANGER!** VISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL
3. Battery label	!!WARNING!! THIS INSTRUMENT WAS DESIGNED TO USE ONLY TSI SUPPLIED BATTERIES, PN 801680 or !!WARNING!! THIS INSTRUMENT WAS DESIGNED TO USE ONLY TSI SUPPLIED BATTERIES, PN 801680
4. European symbol for non-disposable item. Item must be recycled.	

Description of Caution/Warning Symbols

Appropriate caution/warning statements are used throughout the manual and on the instrument that require you to take cautionary measures when working with the instrument.

Caution

	C A U T I O N
⚠	Failure to follow the procedures prescribed in this manual might result in irreparable equipment damage. Important information about the operation and maintenance of this instrument is included in this manual.

Warning

	W A R N I N G
⚠	Warning means that unsafe use of the instrument could result in serious injury to you or cause damage to the instrument. Follow the procedures prescribed.

Caution and Warning Symbols

The following symbols may accompany cautions and warnings to indicate the nature and consequences of hazards:

⚠	Warns that the instrument contains a laser and that important information about its safe operation and maintenance is included in the manual.
⚠	Warns that the instrument is susceptible to electro-static discharge (ESD) and ESD protection should be followed to avoid damage.
⏚	Indicates the connector is connected to earth ground and cabinet ground.

Reusing and Recycling

As part of TSI® Incorporated's effort to have a minimal negative impact on the communities in which its products are manufactured and used:

🗑 **DO NOT** dispose of used batteries in the trash. Follow local environmental requirements for battery recycling.

🗑 If instrument becomes obsolete, return to TSI for disassembly and recycling.

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Chapter 1

Unpacking and Parts Identification

Carefully unpack the Model 8530/8532 DustTrak™ II Aerosol Monitor from the shipping container. Use the tables and illustrations below to make certain that there are no missing components. Contact TSI® immediately if anything is missing or damaged.

NOTE
If you purchased a DustTrak™ II Model 8530-NA (no accessories) Aerosol Monitor, it only comes with the following items: • DustTrak™ II Model 8530 Aerosol Monitor • Operations manual • TrakPro™ Data Analysis Software CD • One-year calibration certificate • Service paperwork • 2-year warranty All accessories for the DustTrak™ II Model 8530 Aerosol Monitor are sold separately. Contact TSI® at (800) 680-1220 for information on accessories and how to purchase them through a TSI® sales representative.

Unpacking the DustTrak™ II Aerosol Monitor

Compare all the components you received with those listed in the table below. If any parts are missing, contact [TSI®](#).

Item	Qty	Part Number	Description
 or	1	8530	Desktop II
		8532	Handheld II
	1	801670	Desktop II Carrying Case
		801669	Handheld II Carrying Case
	1	1090014	Data Analysis Software CD-ROM
	1	800663	Zero Filter

Item	Qty	Part Number	Description
 or	1	801680	7800 mAH Lithium Ion Rechargeable Battery (Desktop)
		801681	Rechargeable lithium ion battery (Handheld)
	1	1303740	USB cable
	1	801652	Analog/alarm output cable (Desktop models only)
	1	6001893	Operation and Service Manual
	1	N/A	Calibration Certificate

Item	Qty	Part Number	Description
	1	801688	Conductive Tubing
	1	801668	Filter removal tool (Spanner Driver)
	4	801673	Spare Internal Filter Elements Desktop Model Only
	2		37-mm filter includes: Filter body top Filter body bottom Mesh screen
	1		Comes with 37-mm cartridge opening tool
	8	801666	Spare Internal Filters Handheld Model Only
	1	801667	Impactor Kit
		$PM_{2.5}$ assembled Top Bottom Impaction Plate $PM_{1.0}$ Top $PM_{4.0}$ Top PM_{10} Top Extra Impaction Plate	
	1	801691	Dorr-Oliver Cyclone

Item	Qty	Part Number	Description
	1	801684	Power Supply – Desktop
		801694	Power Supply – Handheld
	2	N/A	Stylus
When shipped, one stylus will be in the accessory bag, the second stylus attached to instrument.			
	1	3012094	Screwdriver, dual ended. (For Handheld Models only)
	1	801674	Impactor Oil
	2	801698	Inlet cap
When shipped, one inlet will be in the accessory bag, the second inlet attached to instrument.			
	1	801675	External Pump Kit *for 8530EP only*

Item	Qty	Part Number	Description
	1	801797	External Pump Power Cable (to DustTrak™ monitor) *for 8530EP only*
	1	801798	External Pump Flow Tube (to DustTrak™ monitor) *for 8530EP only*
	1		Exhaust Adapter, DustTrak™ monitor *for 8530EP only*

Optional Accessories

The following photos and table list optional accessories. If you ordered optional accessories, make certain they have been received and are in working order.

Accessories	Qty	Part Number	Description
	1	801675	External Pump Kit
	2	801795	DustTrak™ II/DRX External Pump Service Kit for 8530EP only. Contains two filters for External Pump
	1	801685	Battery Charger, 2-Bay, Battery 801680 for Desktop DustTrak™ monitor
	1	801686	Battery Charger, Battery 801681 for Handheld DustTrak™ monitor

Parts Identification for the DustTrak™ II Desktop Aerosol Monitor Models 8530
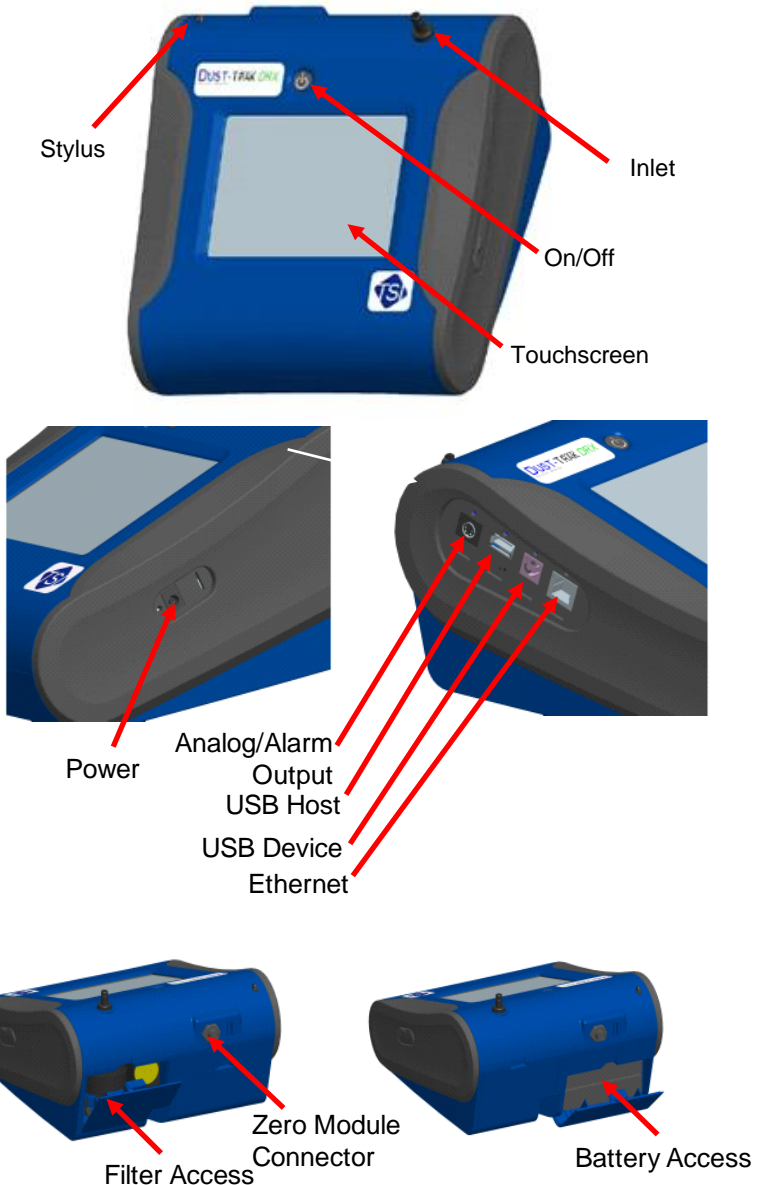
Figure 1-1: Features on Desktop Model 8530

Parts Identification for the DustTrak™ II Desktop Aerosol Monitor Model 8530EP

External Pump Power Connection

External Pump Flow Tubing

Exhaust Adapter
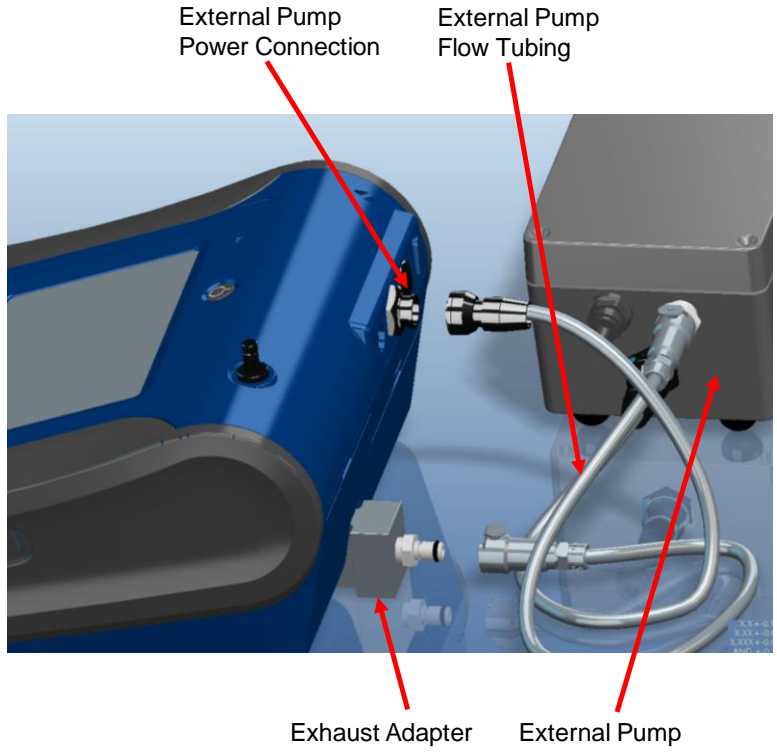
External Pump

External Pump Module (8530EP only)

Pump

Pump Suction End

FLOW

FLOW

User Replaceable HEPA Filters

Pump Power Connection

Pump Exhaust End
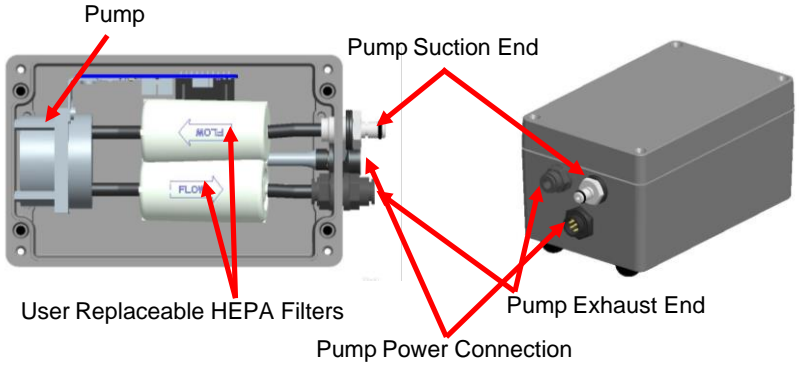
Figure 1-2: Features on Desktop Model 8530EP

Parts Identification for the DustTrak™ II Handheld Aerosol Monitor Model 8532
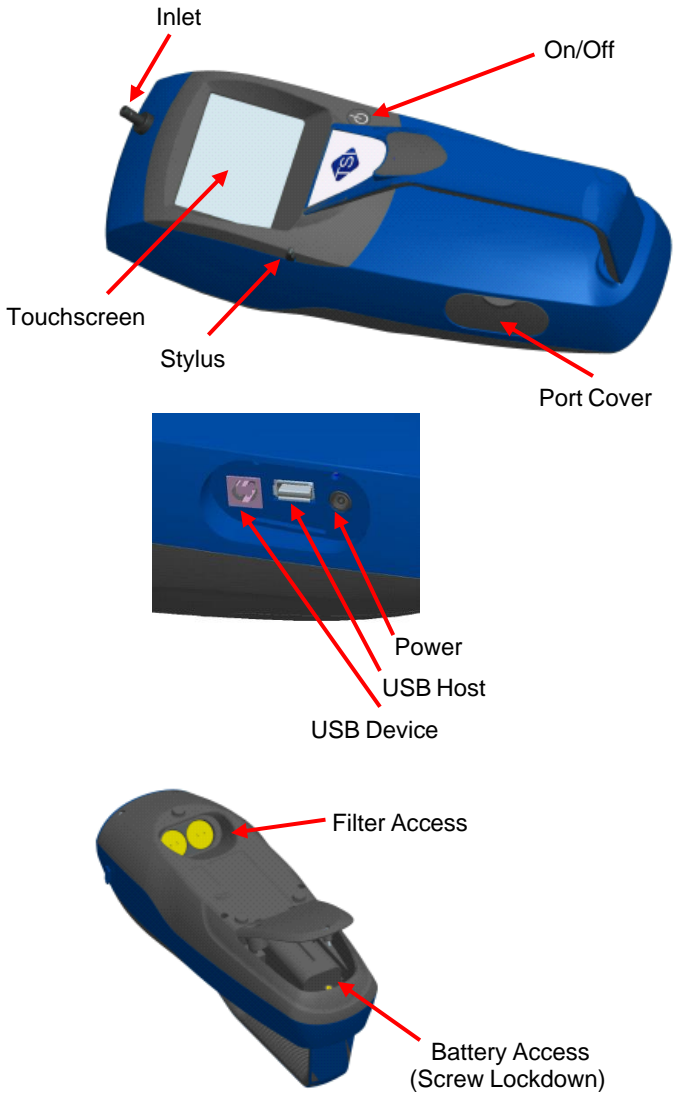
Figure 1-3: Features on Handheld Model

Chapter 2

Setting Up

Supplying Power to the DustTrak™ II Aerosol Monitor

The DustTrak™ II Aerosol Monitor must be powered by either batteries or using the external AC adapter.

	W A R N I N G
⚠️	The instrument has been design to be used with batteries supplied by TSI®. **DO NOT** use a substitute. Disposing of old batteries must be recycled in accordance with the local environmental regulations.

	W A R N I N G
⚠️	**DO NOT** use non-rechargeable batteries in this instrument. Fire, explosions, or other hazards may result.

Installing the Batteries in Model 8530/8530EP Desktop

Remove the battery cover and slide one or two batteries into the battery slots. A single battery can be put into either slot. Orient the batteries with the label side facing up (see Figure 2-1).
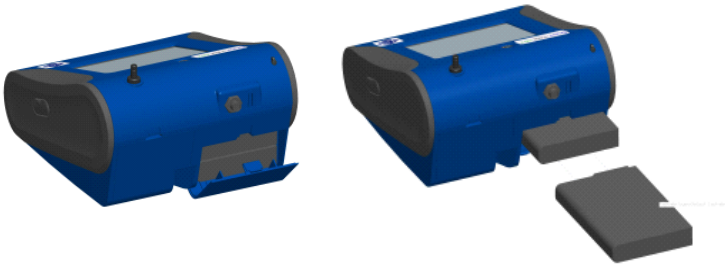
Figure 2-1: Batteries into Desktop Unit

Installing the Batteries in Model 8532 Handheld

Remove the battery cover by loosening captured screw on the bottom of the unit. Orient battery with brass connectors facing forward. Insert battery into cavity and slide forward to engage into pins. Replace the battery cover and secure by tightening screw (see Figure 2-2).
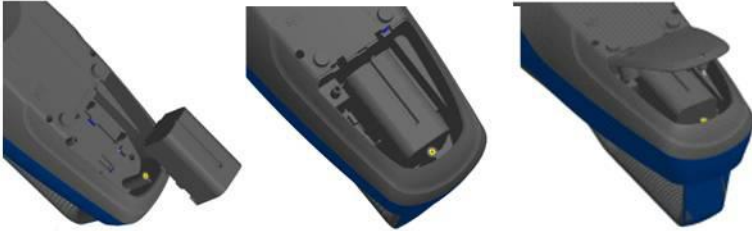
Figure 2-2: Batteries into Handheld Unit

Connecting the External Pump to DustTrak™ Model 8530EP

The Model 8530EP is a Desktop DustTrak™ monitor with an external pump. This DustTrak™ monitor has no internal pump and will not work with any other external pump other than the one provided by TSI® (P/N 801675). The Model 8530EP is intended for applications where the DustTrak monitor is operated continuously over extended periods (several days to months) under wide temperature fluctuations (0 to 50°C). The external pump is designed to be more robust for 24/7 operation of the DustTrak monitor and is warranted to operate continuously for one full year or 8760 hours. The Model 8530EP is ideal for fugitive dust monitoring.

The pump and the DustTrak monitor come separately and require assembly. Follow the steps below to connect the pump with the Model 8530EP DustTrak monitor.

⚠	**W A R N I N G**
	Turn the DustTrak monitor OFF before connecting the external pump. Turn the DustTrak monitor ON only after connecting the External Module.

1. Connect the pump end of the quick connect to the pump module (see Figure 2-3).
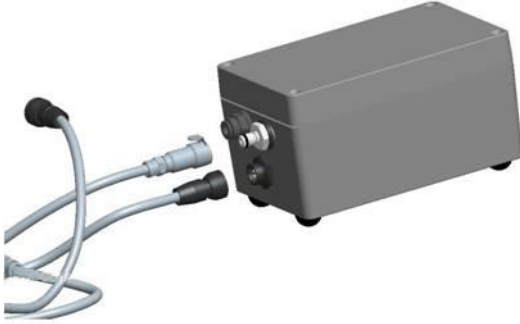
Figure 2-3: Connect Pump End of Quick Connect to Pump Module

2. Likewise, plug one end of the power connector to the pump module as shown above. Turn the power connector until it clicks and locks in place. This prevents the connector from disconnecting due to vibration or movement.

3. Connect the exhaust adapter to the exhaust of the DustTrak™ monitor (see Figure 2-4).

Figure 2-4: Connect Exhaust Adapter to Exhaust of DustTrak Monitor

4. Connect the other end of the flow tubing to the exhaust adapter of the DustTrak™ monitor.

5. Connect the other end of the power connector to the DustTrak™ monitor (see Figure 2-5).
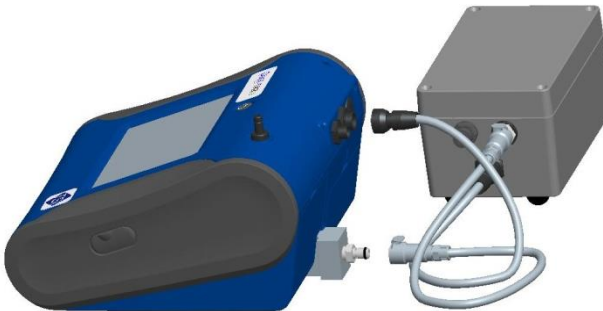
Figure 2-5: Connect Power Connector to DustTrak Monitor

The DustTrak™ external pump module **DOES NOT** require an A/C adapter. It is always powered off the DustTrak™ monitor.

N O T E S

1. The power connector and the flow quick connect "click" when securely connected. The power connector must be rotated clockwise past the locking pin.
2. **DO NOT** hot-plug the External Pump Module when the DustTrak™ monitor is turned ON. Always connect the External Pump module first and then turn the DustTrak monitor ON.
3. TSI® recommends that the DustTrak monitor with the external pump be operated in the Model 8535 Environmental Enclosure.
4. TSI® recommends that the pump module be operated when mounted on its feet and avoid operating at other orientations as much as possible.
5. Pump module and the DustTrak monitor should be at the same electrical potential.
6. The additional port on the external pump module is where the pump exhausts the flow. For applications where the DustTrak monitor is sampling from a chamber or a duct at pressures significantly different from the ambient, TSI® recommends plumbing the exhaust of the external pump back in to the chamber/duct.

Using the AC Adapter to Run Instrument

The AC adapter allows you to power the DustTrak monitor from an AC wall outlet. When using the AC adapter, the batteries (if installed) are bypassed.

Battery Charging

This instrument will charge the Lithium Ion battery packs. Insert the batteries into the battery compartment, plug the instrument into AC power, and turn the instrument on. Batteries will charge only when the instrument is on and in stand-by mode. Batteries will not charge if the instrument is turned off or is actively taken measurements. Charging will stop when the batteries are fully charged.

Inlet Cap

When using the DustTrak™ monitor to sample environmental air, the inlet cap should be put over the instrument. This cap will keep large objects from dropping into and plugging the inlet. The cap will also keep direct light from shinning into the chamber and skewing the results.

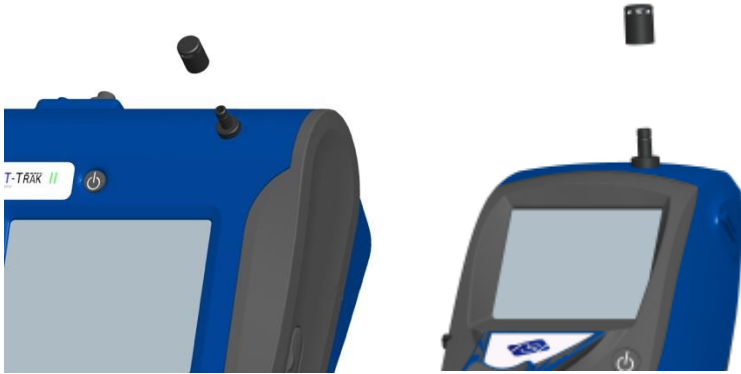The inlet cap can simply be pressed onto the instruments inlet.

Figure 2-6: Putting on Inlet Cap

Size-Selective Impactors

Size-selective impactors can be attached to the inlet of the DustTrak II instruments. Size-selective impactors can be used to pre-condition the size range of the particles entering the instrument. PM_1, $PM_{2.5}$, PM_4 (Respirable) and PM_{10} impactors are available. **The instrument must run at the factory default setting of 3.0 L/min for the impactors to achieve the correct cut points.**

The size-selective impactor is composed of three parts; the cap, impaction plate and bottom. Selection of the cap will determine cut size of the impactor. Each cap is labeled with the particle cut size (1 µm, 2.5 µm, 4.0 µm or 10 µm). The same impaction plate and bottom are used on all impactor sizes.

Cap (1 µm, 2.5 µm, 4 µm or 10 µm)

Impaction Plate

Bottom

Figure 2-7: Size-Selective Impactor

The impactor assembly is attached to the instrument in place of the inlet cap. The inlet cap does not need to be used if an impactor is being used. See Chapter 4, "Maintenance," for instructions on how to add oil to the impaction plate.

Dorr-Oliver Cyclone

A Dorr-Oliver cyclone is shipped with the instrument. The Dorr-Oliver cyclone removes particles over 4.0 µm in size. The Dorr-Oliver cyclone is attached to the instrument by sliding the cyclone clip over the protruding catch. The tube from the Dorr-Oliver cyclone needs to be routed to the inlet of the instrument.
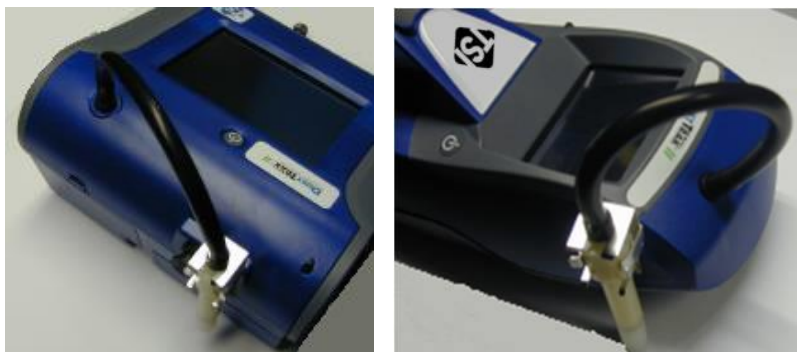

Figure 2-8: Installing Door-Oliver Cyclone

DO NOT use Inlet attachments (impactors or inlet cap) when using the Dorr-Oliver Cyclone. **The instrument flow rate must be changed to 1.7 L/min when using the Dorr-Oliver Cyclone in order to achieve a 4 µm (respirable) cut-point.** See the Flow Cal instructions in the Operations chapter for instructions on how to change the instruments flow rate.

Instrument Setup

The DustTrak™ II monitor can be connected to a computer to download data and upload sampling programs.

Connecting to the Computer

Connect the USB host port of a Microsoft® Windows®-based computer to the USB device port on the side of the DustTrak monitor.

Installing TrakPro™ Data Analysis Software

TrakPro™ software can preprogram the DustTrak™ monitor, download data, view and create raw data and statistical reports, create graphs, and combine graphs with data from other TSI instruments that use TrakPro™ software. The following sections describe how to install the software and set up the computer.

NOTE
To use TrakPro software with the DustTrak™ Aerosol Monitor, the PC must be running Microsoft® Windows® and the computer must have an available Universal Serial Bus (USB) port.

®Microsoft and Windows are registered trademarks of Microsoft Corporation.

1. Insert the TrakPro™ Data Analysis Software CD into the CD-ROM drive. The install screen starts automatically.

| **NOTE** |
| --- |
| If the software does not start automatically after a few minutes, manually run the program listed on the label of the CD using the **Run** command on the Windows® Start Menu. |

2. Follow the directions to install TrakPro™ software.

TrakPro™ software contains a comprehensive installation guide. TSI® recommends printing out this guide prior to starting the TrakPro software installation on your computer, so it may be consulted during the installation. The TrakPro Software manual is located in the "Help" file in TrakPro software. There is no separately printed TrakPro Data Analysis software manual.

Connecting Analog/Alarm Output

The Analog/Alarm Output Cable plugs into the alarm connection on the side of the instrument. This feature is on the desktop model 8530 only.

The cable contains a 4-pin, mini-DIN connector. The pin-outs for the connector and the wiring for the cable are shown below.

Analog Output (+)

Alarm Positive **(+)**

Analog Ground (–)

Alarm Ground (–)

4-pin miniDIN connector
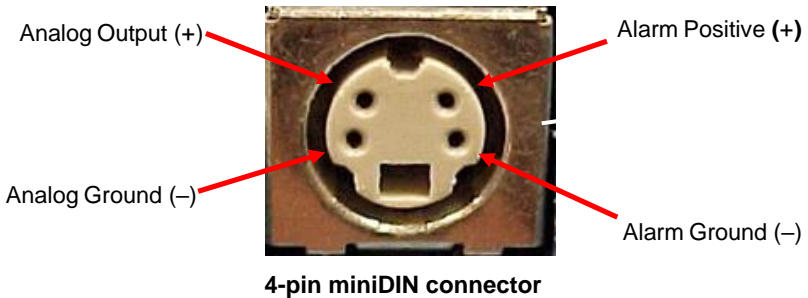
Cable Wiring Diagram	
Brown Wire	Analog Ground
Orange Wire	Analog Out
Red Wire	Alarm (+)
White Wire	Alarm (-)
Black Wire	Shield

Figure 2-9: Cable Wiring Diagram

Wiring the Analog Output

System specifications:

- Output voltage: 0 to 5 VDC. With a maximum output of 15 mA.
- Output Current 4 mA to 20 mA with a maximum load impendence of 250 ohms.
- Correct polarity must be observed (see pin-outs above).

The output cable supplied by TSI® (P/N 801652) is labeled with the pin-out wiring diagram. Additional equipment may be needed for making connections to the system that TSI® does not supply. It is your responsibility to specify and supply all additional equipment.

Wiring the Alarm

System specifications:

- Maximum voltage: 15 VDC (**DO NOT USE AC POWER**)
- Maximum current: 1 Amp
- Correct polarity must be observed (see pin-outs above)
- The alarm switch, located inside the DustTrak™ monitor must be located on the ground side of the alarm system.

	W A R N I N G
⚠️	The DustTrak™ monitor Alarm Output function **SHOULD NOT** be used to detect hazardous conditions or to provide an alarm for protecting human life, health or safety.

	W A R N I N G
⚠️	The alarm switch **MUST NOT** be wired to AC power! Failure to install the user alarm properly could damage the DustTrak™ instrument and/or void the instrument warranty! Please read and follow all instructions before wiring or operating the user alarm.

	W A R N I N G
⚠️	When connected to the analog out and alarm out connector, you **MUST** use safety certified equipment and/or power sources.

Chapter 3

Operation

Getting Started

The **START UP** screen is displayed initially when the instrument is turned on, following the initial TSI® logo splash screen.
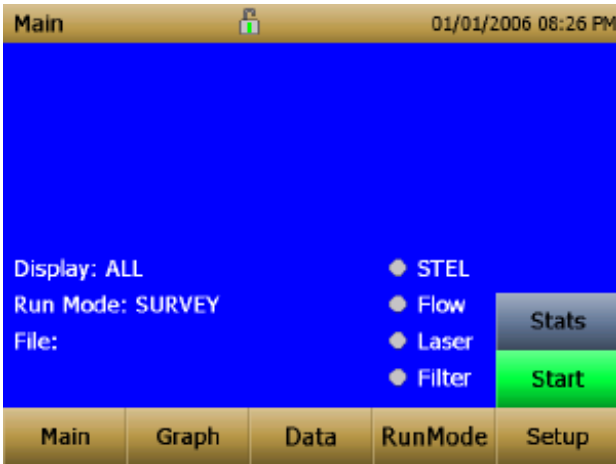
Use a stylus or fingertip, touch the "buttons" on the screen to activate different menus.

For Model DustTrak™ 8530EP only

NOTE
Always setup and operate the DustTrak™ monitor with External Pump Module with the External Pump Module connected to the DustTrak™ monitor. Failure to do so will result in communication errors.

Communication errors take place under four different scenarios as follows:

1. When the unit is idle and **IS NOT** connected to the External Pump Module, a warning displays on the Main screen.

NOTE
"No Pump is Connected" is a sticky error. Even after the warning message, if the External Pump Module is connected to the DustTrak™ monitor, the error will not disappear until the screen is refreshed. Refresh the screen by going into a different menu and returning to the Main menu.

2. When the unit **IS NOT** connected to the External Pump Module and an attempt is made to start a run by selecting "**Start**", an error appears on the Main screen.
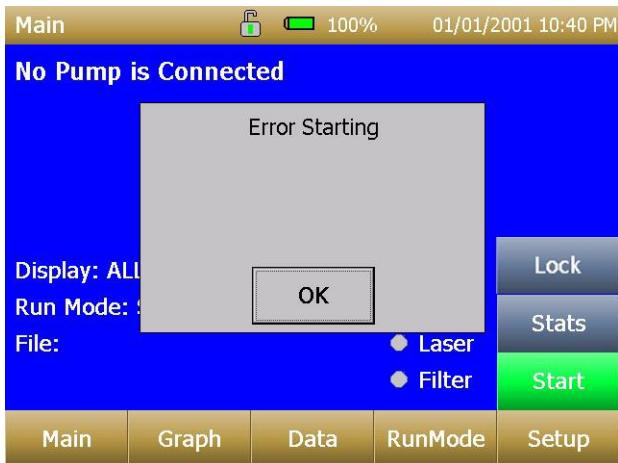
3. If the pump **IS NOT** connected while attempting to perform a Zero Cal, an error appears on the Setup screen.
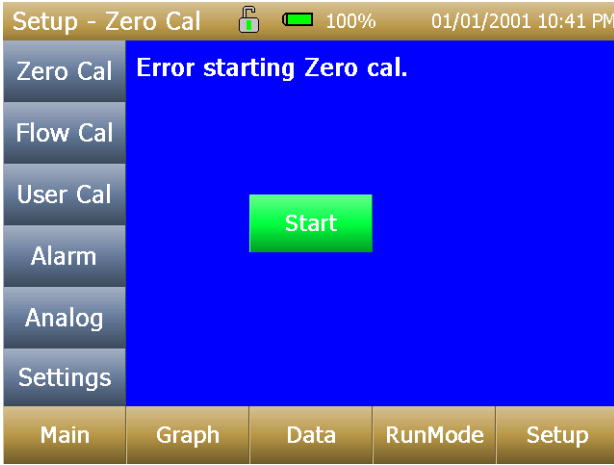
4. If the pump **IS NOT** connected while attempting to perform a Flow Cal, an error appears on the Setup screen.
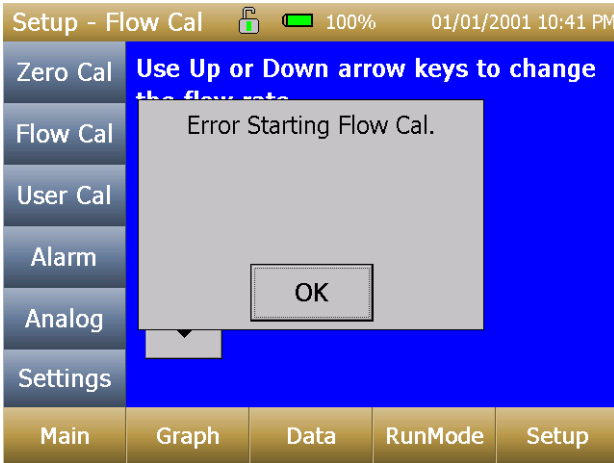
Setup Menu
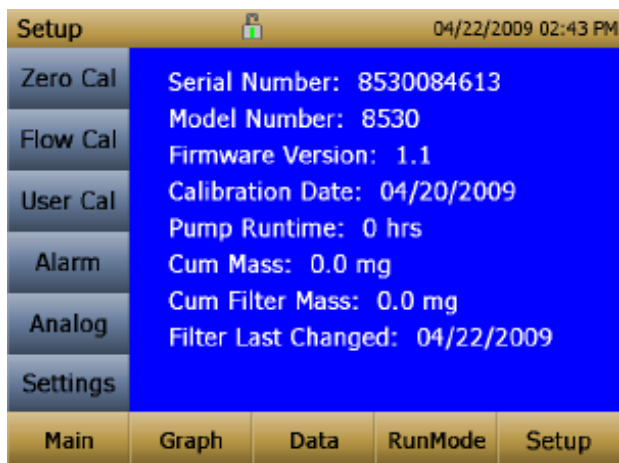
Pressing **Setup** activates the Setup Menu touchscreen buttons along the left edge of the screen. Setup is not accessible when the instrument is sampling.

The main screen of the **Setup** screen displays the following information:

Serial Number	The instruments serial number.
Model Number	The instruments model number.
Firmware Version	Instruments current version of firmware.
Calibration Date	Date of the last factory calibration.
Pump Run Time	Pump running time in hours.
Cum Mass Conc	Amount of mass run through instrument since its last calibration.
Cum Filter Conc	Amount of mass run through instrument since last filter change.
Filter Time	Date of last filter change.

Zero Cal
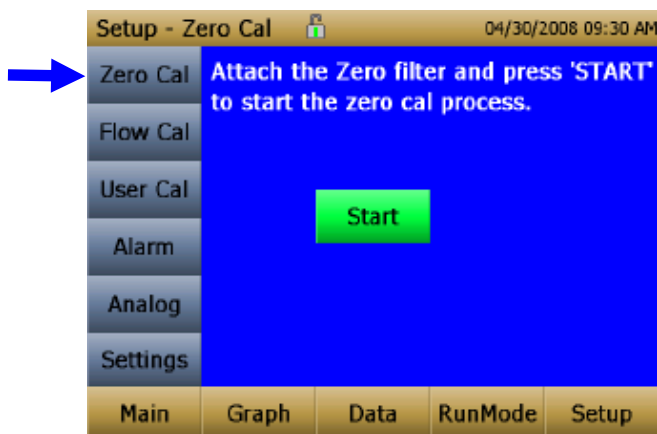
Run **Zero Cal** the first time the instrument is used and repeat prior to every use. Zero Cal requires that the zero filter be attached prior to running. Zero Cal must also be performed if the unit is reading negative concentrations. It is not possible for the DustTrak to read negative concentrations. Negative concentrations are a symptom of zero drift.

NOTE
NEVER perform a zero cal without attaching a zero filter.

1. Press **Zero Cal** Button

2. Attach Zero Filter

3. Press the **Start** button to start Zeroing process.

4. A count-down clock will appear indicating the time remaining. The screen with indicate "**Zero Cal Complete"** when done.

Remove filter after zeroing has been completed. The instrument is now zero calibrated and ready for use.

Flow Cal
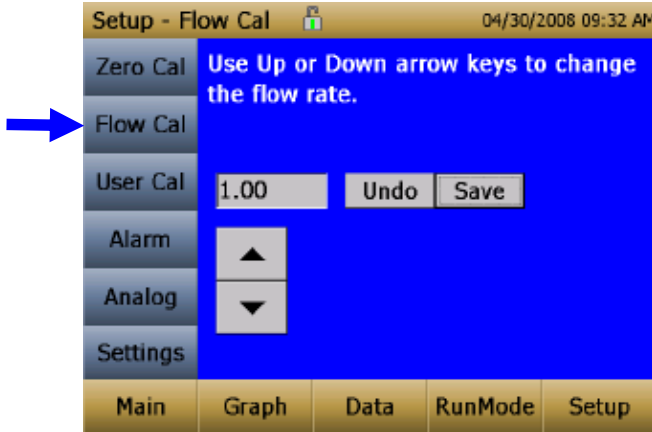
Run **Flow Cal** to change the flow set point. The flow set point is factory set to 3 L/min total flow. 2 L/min of the total flow is measured aerosol flow. 1 L/min of total flow is split off, filtered, and used for sheath flow. There is an internal ΔP flowmeter in the DustTrak™ II instrument that controls flow rate to ±5% of the factory setpoint. TSI® recommends checking the flow with an external flow reference meter, especially when collecting data. The pump will automatically start when entering the Flow Cal screen.

1. Attach a flow calibrator (reference flow meter) to inlet port. You may use a bubble buret, mass flow meter, dry piston or rotameter as flow measurement devices.

2. Move the arrows up or down to achieve desired flow rate on the reference flowmeter. Each up or down arrow will change the flow about 1%. Allow time between button presses to let pump change to the new flow rate.

    Select **Save** once the desired flow rate is achieved. Select **Undo** to return to the factory set point.

NOTE

The flow rate can be adjusted from approximately 1.5 to 4.0 L/min. If needed, this feature can be used to adjust the flow rate to a value other than the factory set point, allowing for the use with the provided Dorr-Oliver Cyclone (1.7 L/min required) or 3rd party size selective inlets (cyclones or impactors) that may require a different flow rate.

User Cal
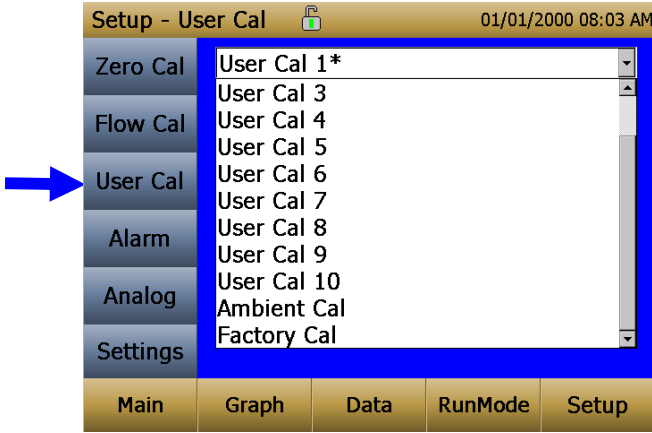
User Cal allows you to store and use 10 different calibration factors. In addition, there are two factory defaults, one is the "Ambient Cal" and the other is the "Factory Cal". The "Ambient Cal" is appropriate for outdoor ambient dust or fugitive dust monitoring. The "Factory Cal" is the calibration to ISO 12103-1, A1 Arizona test dust for which a calibration certificate is provided with the instrument. The "Factory Cal" is appropriate for most workplace aerosol monitoring. The currently active user calibration is highlighted with an asterisk "*".

Four variables can be set for each user calibration.
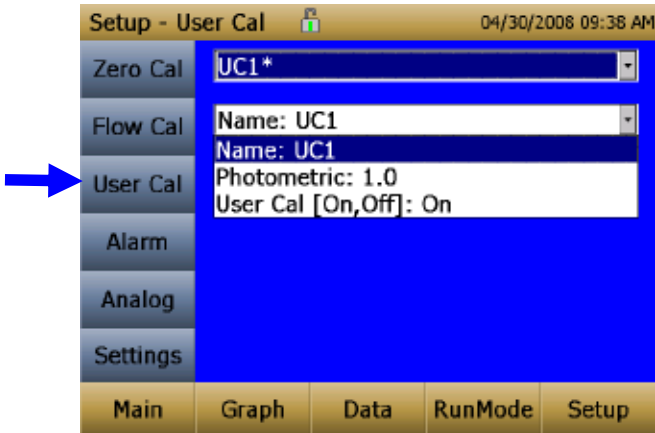
Name	User can rename calibration to a description name.
Photometric	Changes the factory calibration of particle signal, based on Arizona Road Dust, to actual aerosol being measured. See below for sets to set this calibration.
User Cal [on,off]	Selecting **On** will activate current user calibration and deactivate the previously selected user calibration.

Taking a Gravimetric Sample Using the DustTrak™ Monitor

When sampling with the DustTrak™ monitor, you can simultaneously take a gravimetric sample either for custom calibration of the DustTrak™ monitor or for collecting the sample on to the gravimetric filter downstream of the DustTrak monitor without a need for additional gravimetric sampling pump and filter assembly. To accomplish this, follow the instructions given below:

1. Setup the DustTrak monitor to sample how long you want the sample run time to be. The following example shows a sample for 8 hours.

2. Under RunMode menu, put the instrument in Manual Log (Manual Logging is reviewed later in this section), which will enable you to start and stop the pump at any time you choose.

3. Set the logging interval. One minute (i.e., "01:00") is a good choice.

4. Make sure you have a preweighed 37-mm gravimetric filter cassette loaded into the DustTrak™ monitor. See Chapter 4, "Replacing the Internal Filters" on how to access the filter (see figure 4-8) and replace it.

> **NOTE**
> Use only the conductive plastic filter cassette holder (SKC Part# 225-308).

5. Under the Setup Menu, make sure the DustTrak monitor is set to the desired flow rate. For DustTrak II Model 8530, the flow can be varied from 1.7 to 4 L/min for use with various inlet conditioners. For DustTrak DRX Model 8533, *the flow cannot be changed.* The flows for DustTrak II monitor can be changed by changing the default flow calibration setpoint from 1.0 to any value between 0.5 to 1.5 in the span adjustment. An external flowmeter is needed to measure the total flow. Flow can be changed by clicking on the UP or DOWN arrow keys shown below:
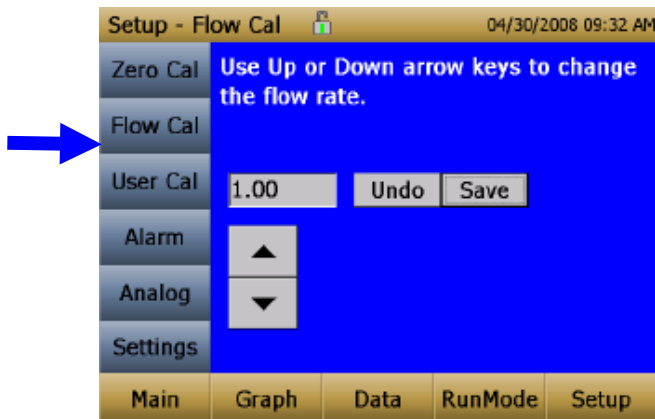
6. Conduct a preflow calibration on the DustTrak™ monitor using the same kind of sample media you will sample with. Now, attach the sample media you intend to sample with and start sampling aerosol for the desired time. After the desired run time, stop the sampling. Remove the filter from the DustTrak™ monitor and follow your laboratory's criteria for filter post weight. Conduct a post-flow calibration with the same sample media done with the pre-flow calibration and determine if these flow calibrations are within ±5% of each other. If they are, use the following to calculate the actual flow rate for the DustTrak™ monitor. The laboratory will need the following information to calculate mass concentration in mg/m^3:

- Total sample time in minutes.

- Flow rate—flow rate of the DustTrak monitor used for gravimetric analysis is only $2/3$ the total flow since $1/3$ of the flow is used as sheath flow.

- Total liters of air sampled = total sample time x flow rate.

7. Using this information the laboratory can determine the concentration using the following formula:

$$concentration, \frac{mg}{m^3} = \frac{Filter\ Post\ Weight\ (mg) - Filter\ Pre\ Weight\ (mg)}{\frac{2}{3} * \frac{DustTrak^{TM} Monitor\ Flow\ Rate\ (\frac{L}{min})}{1000} * Total\ Sample\ Time\ (min)}$$

NOTE

The flow rate used for gravimetric analysis is only 2/3 the total flow since 1/3 of the flow is used as sheath flow.

8. For instructions on how to calibrate the DustTrak monitor using this data, see section below on "Determining the Calibration Factor for a Specific Aerosol".

Photometric Calibration Factor

In most situations, the DustTrak™I mass measurements are dependent upon particle size and material properties, there may be times in which a custom calibration would improve your accuracy for a specific aerosol.

Determining an aerosol specific photometric calibration requires that you determine a true mass concentration (e.g., gravimetric analysis) for the aerosol you want to measure. The true mass concentration is used to calculate the custom calibration factor for that aerosol. Once you have a custom calibration factor, you can reuse it each time you make measurements in the same aerosol environment.

Determining the Calibration Factor for a Specific Aerosol

The DustTrak™ II monitor is factory calibrated to the respirable fraction of standard ISO 12103-1, A1 test dust. The DustTrak™ monitor can be easily calibrated to any arbitrary aerosol by adjusting the custom calibration factor. The DustTrak monitor's custom calibration factor is assigned the value of 1.00 for the factory calibration to standard ISO test dust. This procedure describes how to determine the calibration factor for a specific aerosol. Using the value of 1.00 will always revert back to the factory calibration.

To determine a new calibration factor you need some way of accurately measuring the concentration of aerosol, hereafter referred to as the reference instrument. A gravimetric analysis is often the best choice, though it is limited to nonvolatile aerosols. The internal 37 mm filter cartridge, in the desktop units, can be used to collect the reference gravimetric reference sample.

To make an accurate calibration you must simultaneously measure the aerosol concentration with the DustTrak monitor and your reference instrument.

1. Zero the DustTrak II monitor.

2. Put the instrument in Manual Log (Manual Logging is reviewed later in this section).

3. Set the logging interval. One minute (i.e., "01:00") is often a good choice.

4. Co-locate the DustTrak II monitor and the reference sampler together so that they are measuring from the same area. The 37-mm filter cartridge in the desktop unit can be used to collect the particles to be weighed for the gravimetric reference.

5. Start sampling aerosol with both instruments at the same time.

> **NOTE**
>
> Greater accuracy will be obtained with longer samples. The time you permit for sampling often depends on the reference instrument and characteristics of the measured aerosol. It may take some time to collect sufficient aerosol onto a filter cassette for accurate gravimetric analysis. Refer to instructions of your reference instrument for sampling times.

6. Stop sampling with both instruments at the same time.

7. Record the DustTrak™ monitor average concentration by viewing the sample average in the Data screen. (Data Screen is reviewed later in this chapter.)

8. Determine the mass concentration in mg/m^3 from your reference instrument. For gravimetric sampling this means weighing the gravimetric sample.

> **NOTE**
>
> If you used the internal gravimetric filter in the DustTrak™ Model 8530, the flow rate used to compute the concentration should be 2 L/min, not 3 L/min since only 2 L/min of aerosol flow reaches the filter.

9. Compute the new calibration constant, NewCal, using the following formula:

$$NewCal = \left(\frac{Reference\ Concentration}{DustTrak\ Concentration} \right) \cdot CurrentCal$$

10. Select **Photometric** from the User Cal drop down selection and enter the NewCal factor using the onscreen controls.

Alarm

Alarm allows you to set an alarm level that will be triggered if the instrument's reading goes above the setpoint. However, the alarm functioning is determined by the logging interval. The alarm will turn ON only if the average concentration over the logging interval exceeds the set point. If the logging interval is too long and the concentration exceeds the set point and stays at that level, the alarm will not turn ON until after the logging interval has passed. Likewise, the alarm will not stop until after the concentration has dropped below 5% of the threshold and after the logging interval has passed.
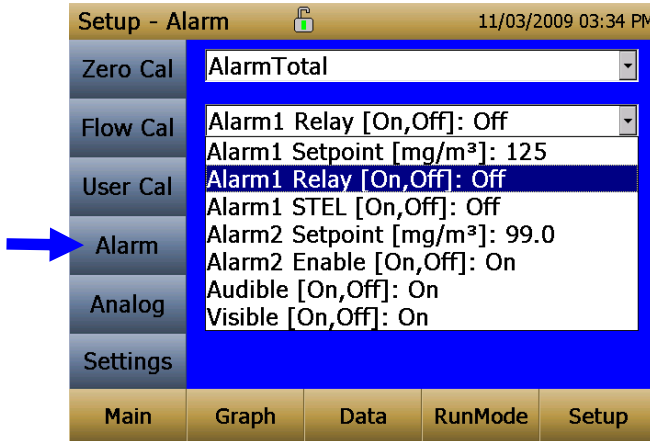
| NOTE |
|------|
| The Alarm is dependent on the logging interval. For the DustTrak™ monitor to alarm as soon as the Alarm Setpoint is exceeded, the logging interval must be set as low as possible (i.e., 1 second or 2 seconds). If a long test duration does not permit setting such a short logging interval, use the STEL alarm instead. The STEL is always based on 1 second concentrations and is independent of the logging interval. For more details on the STEL alarm, see section below on STEL. |
| In Survey mode, the alarm is dependent on the time constant. |

Alarm1 Setpoint [mg/m³]	The alarm1 setpoint is the mass concentration level upon which the alarm1 is triggered. Alarm will trigger if the mass concentration, taken at the logging interval, rises above the setpoint. **NOTE** Alarm 2 must be lower than Alarm 1 when both alarms are enabled.
Alarm1 Relay [On, Off]	When the relay alarm is turned on, unit will close relay switch when Alarm1 level is surpassed. Relay selection is available on the 8530 desktop model only.
Alarm1 STEL [On, Off]	When the STEL alarm is turned on, STEL data will be collected when Alarm1 level is surpassed. STEL selection is available on the 8530 desktop model only. See STEL Note below.
Alarm2 Setpoint [mg/m³]	The Alarm2 setpoint is the mass concentration level upon which the alarm2 triggers. Alarm triggers if the mass concentration, taken at the logging interval, rises above the setpoint. **NOTE** Alarm 2 must be lower than Alarm 1 when both alarms are enabled.
Alarm2 Enable [On, Off]	Enables Alarm2 to be logged and will activate the Audible or Visible alarms if they are enabled.
Alarm Audible [On, Off]	When the audible alarm is turned on, the instrument will activate internal beeper when Alarm1 or Alarm2 level is surpassed.
Alarm1 Visible [On, Off]	When the visible alarm is turned on, unit will show the alarm icon (Alarm1 ▣, Alarm 2 ◁⃟) in title bar when Alarm1 or Alarm2 level is surpassed.

STEL Alarm

STEL stands for **S**hort **T**erm **E**xposure **L**imit. When a STEL alarm is selected, the instrument will inspect the data on a second by second basis, independent from the selected logging interval. If the mass exceeds the STEL limit, then a STEL event triggers and the following actions will be taken.

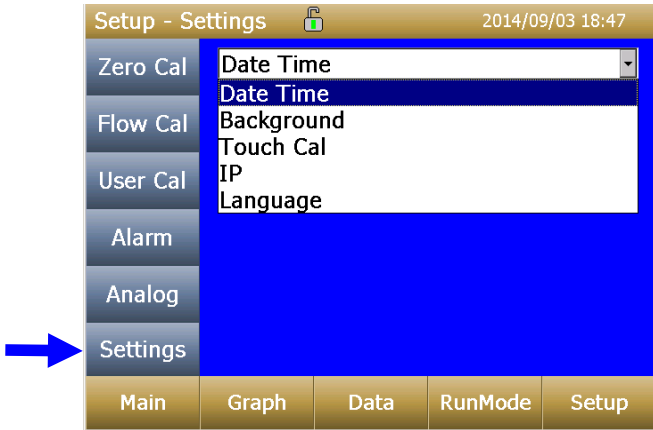| STEL indicator	The STEL indicator ● STEL will show Red on the main screen.
Data	Data will be taken of the STEL alarm channel at a 1 minute logging interval for **15 minutes**.
	This data will be stored in a separate file named STEL_XXX, where XXX will be matched to the logged data file.
	The instrument will also continue to log the mass concentration data at the logging interval selected.
STEL Alarm repeat	If the instrument remains over the STEL limit after the 15 minute interval, or if the instrument exceeds the STEL limit later during the sample period, additional STEL files will be generated.

Analog
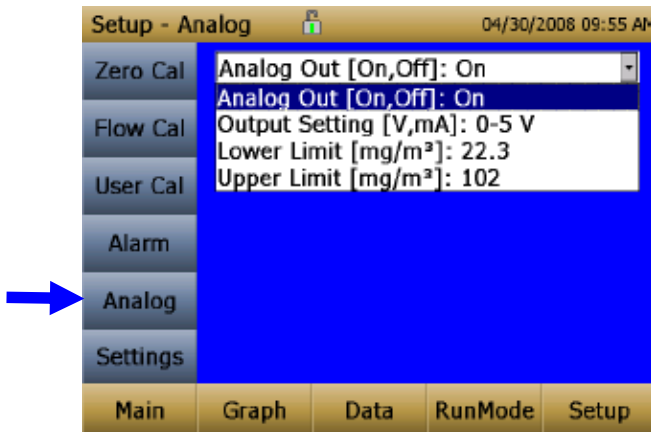
Analog setup screen sets the parameters that will drive the analog out port. Applies to the 8530 Desktop model only.
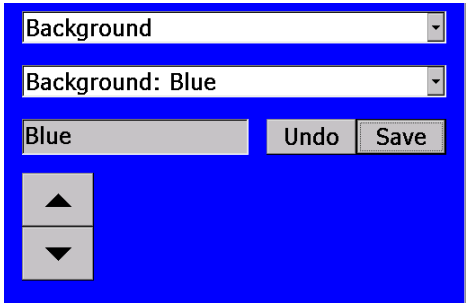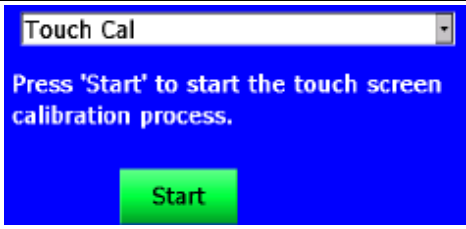
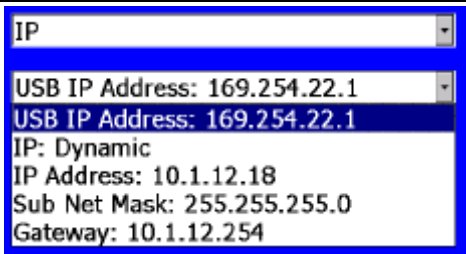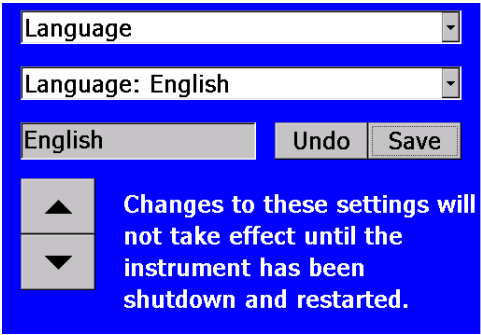| Analog out [On, Off]	Turns analog out port on.
Size Fraction	Selects the size channel that will drive the analog out.
Output Setting [V, mA]	Select between 0 to 5 V and 4 to 20 mA.
Lower Limit [mg/m^3]	Mass concentration reading of the selected channel that will correspond to 0 V or 4 mA.
Upper Limit [mg/m^3]	Mass concentration reading of the selected channel that will correspond to 5 V or 20 mA.

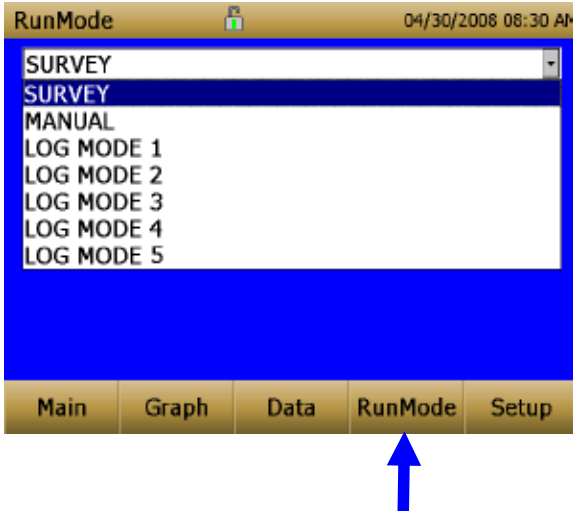**Settings**

Settings screen sets basic unit parameters.

Date Time	
	Sets current date, current time and date/time format. Time can be set in 12 or 24 hour format. Date can be set in yyyy/dd/mm, yyyy/mm/dd or yyyy/dd/mm.

Background	Background `▼` Background: Blue `▼` Blue [Undo] [Save] ▲ ▼ Switches between blue and white backgrounds.
Touch Cal	Touch Cal `▼` Press 'Start' to start the touch screen calibration process. Start Calibrates the touch cal screen.
IP	IP `▼` USB IP Address: 169.254.22.1 `▼` USB IP Address: 169.254.22.1 IP: Dynamic IP Address: 10.1.12.18 Sub Net Mask: 255.255.255.0 Gateway: 10.1.12.254 **USB PORT IP Address**: USB IP is the address assigned to the instrument by the NDIS driver. It is shown but cannot be changed. **Ethernet Port IP parameters**: (Model 8530 Desktop only.) IP method can be set to static or dynamic. For static IP, IP address, default gateway, and subnet mask can be set. For Dynamic, The IP assigned by the network is shown. This cannot be changed. See Note below.

	IP NOTE
	After changing the instrument to Dynamic or Static, reboot the instrument.
	In Dynamic Mode, the unit will show the IP to which is assigned (after being rebooted).
Language	Language
	Language: English
	English Undo Save
	▲ **Changes to these settings will not take effect until the instrument has been shutdown and restarted.** ▼
	Switches between display languages. After changing the display language, reboot the instrument.

Run Mode

RunMode   04/30/2008 08:30 AM

SURVEY
SURVEY
MANUAL
LOG MODE 1
LOG MODE 2
LOG MODE 3
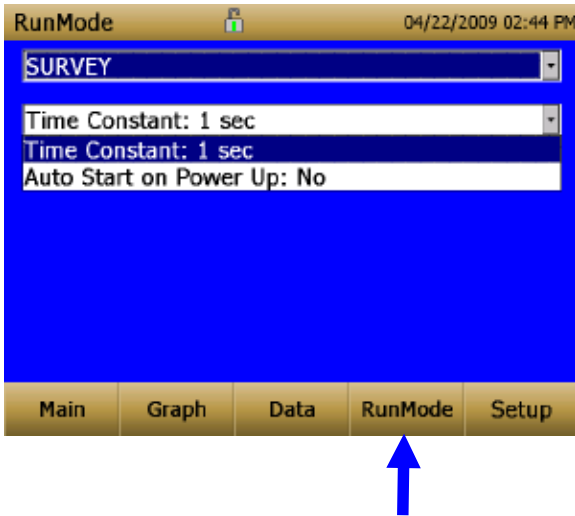LOG MODE 4
LOG MODE 5

Main   Graph   Data   RunMode   Setup

The **RunMode** tab brings up sampling mode options.

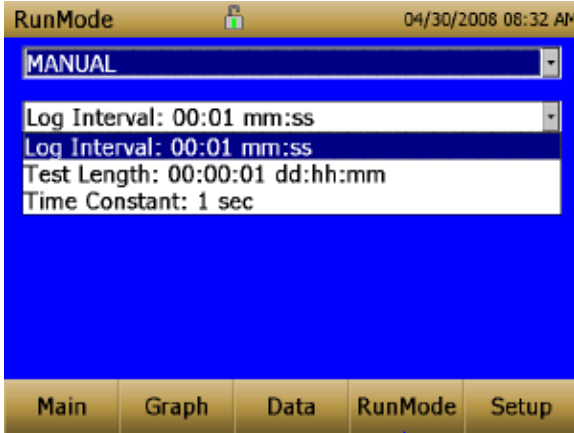Sampling mode options include **Survey Mode**, **Manual Log**, and
Log Mode 1-5.

Survey	Survey Mode runs a real time, continuous active sample, but does not log data.
Manual	Manual Log sets the instrument to log data for a specified run time.
Log Modes	Log Mode starts and stops the instrument at specified times, run for a specified test length, and perform multiple tests of the same length with a specified time period between tests.

Survey Mode

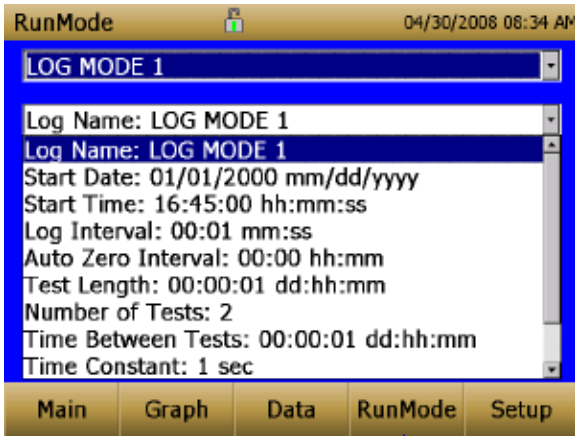| Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.
Auto Start on Power Up	When set to "Yes", unit will start a measurement upon being powered on, if the unit was set to "Survey" when it was turned off. When set to "No", the unit will be in idle when it is powered on.

Manual Mode

Log Interval	The log interval can be set from 1 second to 60 minutes. It is the amount of time between logged data points.
Test Length	Test length can be set from 1 minute to the limit of the data storage.
Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.

In Manual mode, data will be stored to a file named "*Manual_XYZ*" where *XYZ* is an incrementing integer.

Log Mode (1–5)

Log Name	Log Name, brings up a virtual keypad to name the Logged Data file.
Start Date	Start Date, select the date the test will start.
Start Time	Start Time, select the time the test will start.
Log Interval	The log interval can be set from 1 second to 60 minutes. It is the amount of time between logged data points.
Auto Zero Interval	Interval between re-zeroing the instrument using the Auto-Zero accessory. Model 8530 desktop only.
Test Length	From 1 minute to the limit of the data storage.
Number of Tests	Number of tests, 1 to 999.
Time between Tests	Time between tests, 1 minute to 30 days.
Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.
Use Start Date	Use Start Date, option to use programmed start date or by pass programmed start date.
Use Start Time	Use Start Time, option to use programmed start time or bypass programmed start time.

In Log mode, data will be stored to a file named "*LogName_XYZ*" where *LogName* is the user entered log name and *XYZ* is an incrementing integer.

Locking Feature

The locking feature allows you to lock the screen at any time. This can be done during mass concentration measurements and while the instrument is idle.
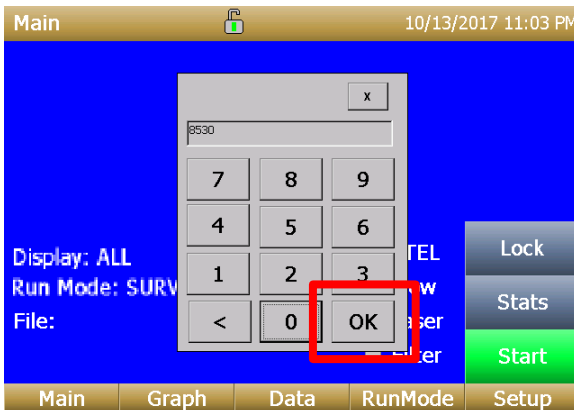
NOTE
This feature is only available on Desktop models. It is not available on Handheld models.

To enable this feature, touch the **Lock** button on the main screen.

Next enter the model of the instrument. For 8530EP models, 8530 should be used. After entering the model number, touch **OK**.
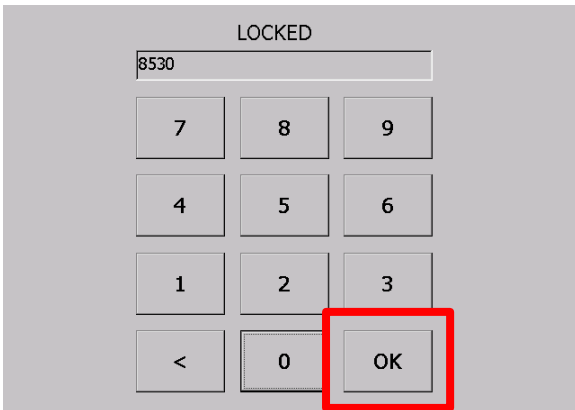
The screen is now locked.

To unlock, touch **UNLOCK** and re-enter the model number. For 8530EP models, 8530 should be used. After entering the model number, touch **OK**.

NOTE
If you happen to enter the model number incorrectly and touch **OK**, you will be given another chance to enter it correctly. There is no limit to number of chances.

Taking Mass Concentration Measurements

Measurements are started and controlled from the main screen.

Prior to starting a measurement the instrument should be zeroed from the **Setup** screen and the run mode should be configured and selected from the **RunMode** screen.

When the instrument is on, but not taking any mass measurements the start button will be green and instruments pump will not be running. To start taking a measurement, press the green **Start** button.
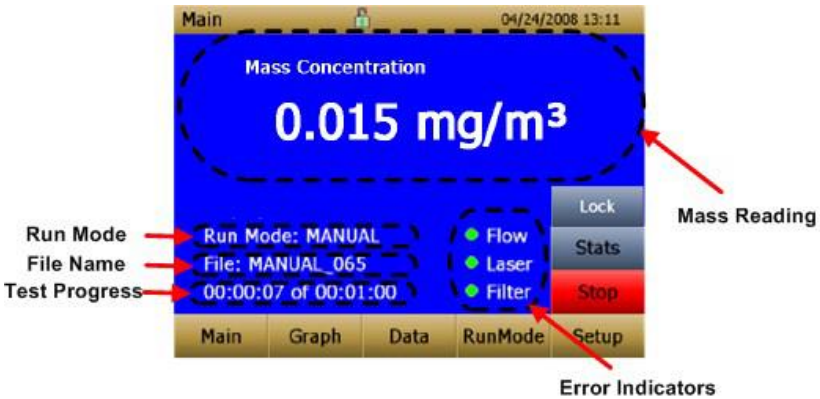
For the Model 8530EP DustTrak™ monitor with external pump, make sure the external pump is connected to the DustTrak™ monitor as described in Chapter 2. If the pump is not connected and the green start button is pressed, the DustTrak™ monitor will identify that the pump is not connected and a warning will be displayed as shown below:

Connect the External Pump Module to the DustTrak™ monitor and then try again. TSI® recommends powering down the DustTrak™ monitor before connecting the External Pump Module to the DustTrak™ monitor. Connect the power cable and the flow tubing between the DustTrak monitor and the External pump module, as applicable.

While taking a measurement the screen will display the current measured mass concentration. The various regions of the screen are shown below.

Screen Regions

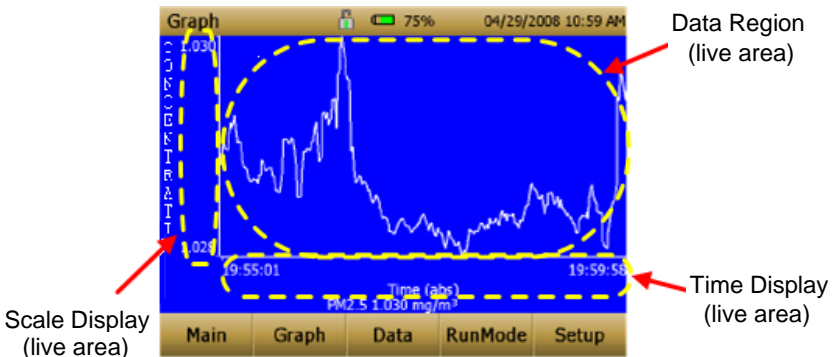| Mass Reading	Shows the instruments mass measurements.
Run Mode Region	Shows the run mode selected from the RunMode screen.
File Name Region	Displays the file name to which the data is currently being saved.
Test Progress Region	Shows the time-based progress of the test.
Error Indicator Region	Shows the current stats of the instrument STEL: Shows if STEL is in progress (desktop instruments only) Flow: Status of the flow control Laser: Status of the Laser Filter: Status of the Filter See Chapter 5, "Troubleshooting," to resolve any of these error conditions.

Stats

The Stats button shows the statistics of the mass measurement. When the Stats button is pressed, the main mass reading will reduce in font size, and the measurement statistics will show on the right side of the screen.
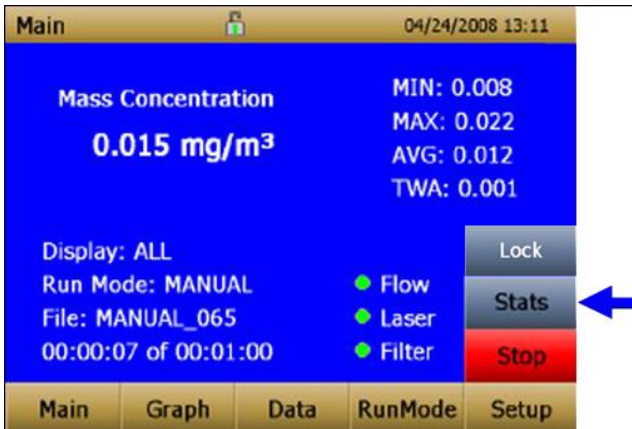
Graphing

During sampling, pressing the **Graph** button displays current readings in graphical form.

- During Survey Mode, five (5) minutes of running real-time data is displayed graphically.

- During Logging Mode, the entire log test time is displayed on the graph.

Data Region (live area)

Time Display (live area)

Scale Display (live area)

Time Display	Pressing the **Time** x-axis label on the graph screen switches between **Time (s)**, **Time (abs)**, and **Time (rel)**.
	Time (s): Elapsed time from first logged point (log interval) to the last logged point (test length).
	Time (rel): Relative time from zero to last logged point (test length – log interval).
	Time (abs): Absolute time from first logged point (test start + log interval) to last logged point (test stop).
Scale Display	Pressing in the Scale Display area will bring up a dialog that will allow changing between auto scaling and user scaling of the Y-axis.
Data Region	Pressing the data region will bring up a dialog to show TWA or Average lines.
	TWA: Will show a secondary line on the graph showing the time weighted average of the data. This line will not show if test time is less than 15 minutes.
	Average: Show a secondary line on the graph of the running average of the data.

In Graphing Mode, pressing **Main** returns the instrument to the Main Screen display.
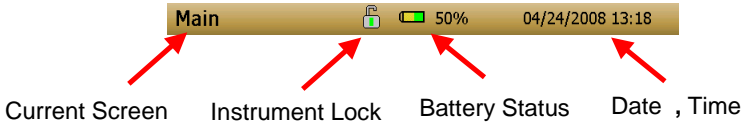
Viewing Data

The **Data** button opens a list of data files for viewing.

Select File	Press the arrows on the right side of the screen to scroll up or down to the data file to be viewed.
Data Statistics	Statistics on the selected file ○ File Name ○ Sample Average ○ Sample TWA ○ Sample Maximum Reading ○ Sample Minimum Reading ○ Number of Data Points in the File
Save All Button	Downloads data to a USB thumb drive. The USB thumb drive must be attached to the USB host port. Data is saved as a .csv file that can be viewed in Microsoft® Excel® spreadsheet software.
Delete Button	Deletes the currently highlighted file.
Delete All Button	Deletes all the files stored on the instrument.
Graph Button	Data can also be viewed in graphical form by pressing the **Graph** button while the data file is highlighted.

Title Bar

The Title Bar shows common instrument information.

Current Screen   Instrument Lock   Battery Status   Date , Time

Current Screen	Title of the current screen that is being displayed.
Instrument Lock	Icon shows if the instrument touchscreen is in an unlocked or locked condition. **Unlocked**: **Locked**: To lock the touchscreen controls, touch the "lock" icon, immediately followed by three (3) quick touches on the current screen (**Main)** word along the top tool bar. Repeat the process to unlock the screen.
Battery Status	Show the current % life of the battery and show if the battery is currently being charged: **Charging**: (unfilled portion of the icon is filled yellow as well as animated to indicate that the charging is in progress) **Not Charging**: (unfilled portion of the icon transparent)
Date and Time	Indicates the instruments current date and time.
Alarm	If the instrument is in an alarm status, an alarm icon will appear in the title bar.

Chapter 4

Maintenance

The DustTrak™ II aerosol monitor can be maintained in the field using the instructions below. Additionally, TSI® recommends that you return your DustTrak™ II monitor to the factory for annual calibration. For a reasonable fee, we will quickly clean and calibrate the unit and return it to you in "as new" working condition, along with a Certificate of Calibration. This "annual checkup" helps ensure that the DustTrak™ II monitor is always in good operating condition.

N O T E
There are no user-serviceable parts inside this instrument. The instrument should only be opened by TSI® or a TSI® approved service technician.

Maintenance Schedule

The DustTrak II Aerosol Monitor requires maintenance on a regular basis. Table 4–1 lists the factory recommended maintenance schedule.

Some maintenance items are required each time the DustTrak monitor is used or on an annual basis. Other items are scheduled according to how much aerosol is drawn through the instrument. For example, TSI recommends cleaning the inlet sample tube after 350 hours of sampling a 1 mg/m^3 concentration of aerosol. This recommendation should be pro-rated according to how the instrument is used. 350 hours at 1 mg/m^3 is the same amount of aerosol as 700 hours at 0.5 mg/m^3 or 175 hours at 2 mg/m^3, etc.

Table 4–1. Recommended Maintenance Schedule

Item	Frequency
Perform zero check	Before each use.
Clean inlet	350 hr. at 1 mg/m^3*
Clean 2.5 µm calibration impactor	Before every use.
Replace internal filters	350 hr. at 1 mg/m^3* or when indicated by the main screen filter error indicator.
Return to factory for cleaning and calibration (For 8530EP, TSI recommends that both the DustTrak and the External Pump Module be returned to TSI)	Annually
Replace the internal HEPA filters in the External Pump module	Annually

*Pro-rated, see discussion above.

The DustTrak™ monitor keeps track of the accumulated amount of aerosol drawn through it since its last cleaning. When the internal filter replacement is due, the filter error indicator will turn from green to red.

TSI® recommends you perform a zero check prior to each use for the DustTrak™ monitor and certainly before running any extended tests, and after the instrument experiences a significant environmental change. Examples of significant environmental changes would be ambient temperature changes that exceed 15 °F (8 °C) or moving from locations with high aerosol concentrations to low concentrations.

Zeroing Instrument

1. Attach the zero filter to the inlet of the instrument.

Figure 4-1: Attach Zero Filter to Inlet

2. Follow zero calibration instructions detailed in the operations section of this manual.

Cleaning the Inlet

The inlet should be cleaned based on the schedule in Table 4–1.

1. Turn the DustTrak™ monitor off.

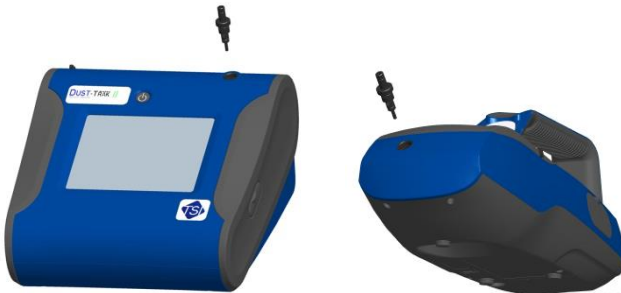2. Unscrew the inlet nozzle from the instrument (Figure 4-2).

Figure 4-2: Unscrew Inlet Nozzle

3. Clean the inlet port. Use a cotton swab to clean the outside of the inlet port. You may dampen the swabs with water or a light solvent (e.g., isopropanol). Clean the inside of the sample tube by using a small brush, along with a light solvent. Dry the tube by blowing it out with compressed air, or let it air-dry thoroughly.

NOTE
Be *careful* NOT to blow particles into the DustTrak™ monitor inlet port.

Figure 4-3: DO NOT Blow into Instrument

4. Screw (hand-tighten) inlet back into instrument.

Cleaning and Oiling Impactors

The calibration impactor should be cleaned prior to every use, using it to perform a Standard Calibration (size correction) on the instrument, as described in the Operations section.

1. Unscrew Impactor. Check O-ring on the impactor base.

2. Clean outside and inside of Impactor and the impactor plate using a clean brush and a light solvent. Dry impactor parts by blowing it out with compressed air, or let it air-dry thoroughly.

3. Apply 2 drops of oil (included) to the impactor plate. **DO NOT** over-fill impaction plate.

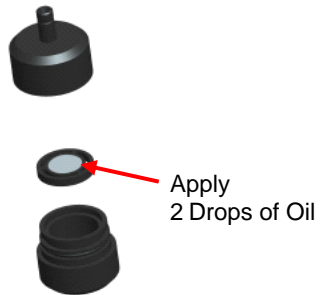4. Screw (hand-tighten) impactor back together.

Apply
2 Drops of Oil

Figure 4-4: Apply 2 Drops of Oil to Impactor Plate

Replacing the Internal Filters

Replace the internal filters based on the schedule in Table 4–1 or when the filter indicator on the main screen changes to red.

1. Turn the instrument off.

2. Remove old filters from the instrument.

   Handheld Model

   a. Use the enclosed filter removal tool (P/N 801668) tool to unscrew the two filter caps located on the bottom of the instrument.

   b. Pull the old filters out of the two filter wells. If filter wells are visibly dirty, blow out with compressed air.

   c. Put two (2) new filters (P/N 801666) into the filter wells and screw filter caps back into place.

Figure 4-5: Pull Filters Out of Two Filter Wells (Handheld Model)

NOTE
Replacement filters were shipped with the new instrument. Order additional filters from TSI® under P/N 801666.

   Desktop Model

   a. Open filter access door on the back of the instrument.

   b. Use the enclosed filter removal tool (P/N 801668) to unscrew filter cap.

   c. Pull out single cylindrical filter from filter well. If filter well is visibly dirty, blow out with compressed air.

   d. Put new filer (P/N 801673) back into filter well and screw filter cap back into place.

Figure 4-6: Pull out Single Cylindrical Filter from Filter Well (Desktop Model)

e. Open blue retention clip by pinching ends inward and pushing down.

Figure 4-7: Open Blue Retention Clip

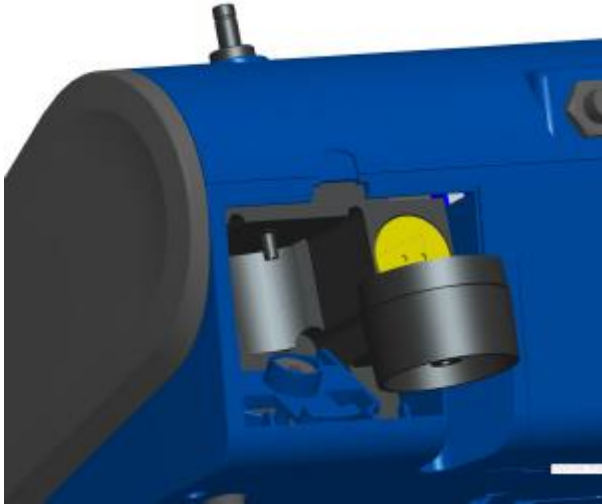f. Remove 37-mm filter cassette by pulling downward and outward.

Figure 4-8: Remove 37-mm Filter Cassette

g. Open filter cassette using enclosed tool P/N 7001303.

h. Remove screen mesh from filter cassette and blow out using compressed air. Blow in reverse direction to remove captured particulate.

Figure 4-9: Open Filter using Enclosed Tool

i. Replace mesh in filter cassette and press halves together. Make sure filter has been fully closed. The filter tool P/N 7001303 can be used to ensure the filter is fully closed.

j. Place filter cassette back into position and close blue retaining clip. Make sure retaining clip snaps back into place.

Figure 4-10: Replace Mesh in Filter Holder

NOTES
• Replacement filters (HEPA and 37-mm Filter Cassette with mesh filter) were shipped with the new instrument. Order additional filters from TSI® under P/N 801673.
• TSI® **DOES NOT** supply any filter media for the filter cassette. Any commercially available 37-mm filter media may be used with the DustTrak™ II or DRX desktop instruments to collect gravimetric reference samples.

3. **It is important to reset the instruments filter counter after replacing filters. Resetting the counter will clear the filter error condition shown on the main screen.** Reset the counters by the following:

   a. Turn on the instrument.

   b. Press the **Setup** button to go into the setup screen.

   c. Touch the **Cum Filter Conc:** (live key) to reset the aerosol mass.

   Touch
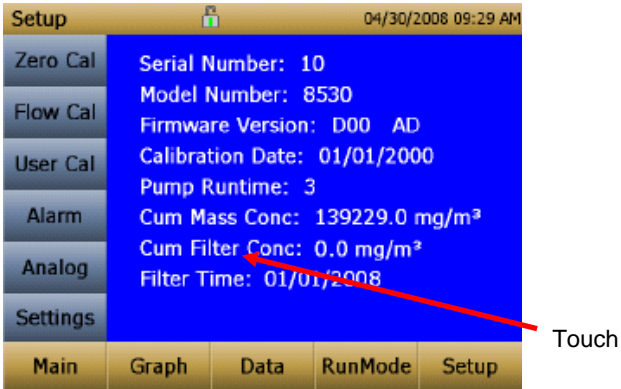
   d. *Replace user serviceable filters?* Dialog will appear. Press **OK**.

   e. *Reset filter concentration?* Dialog will appear. Press **Yes** to reset the cumulative filter concentration to zero.

   f. The Setup screen will now show zero for the **Cum Filter Concentration and** the current date for the **Filter Time**.

Replacing the Filters in the External Pump Module

The external pump module provided with Model 8530EP is designed to run continuously for about a year (8760 hours). There are two HEPA filters that protect the pump from contamination—one on the suction side of the pump and the other on the discharge side of the pump. The discharge side of the pump collects particles shedding from the vanes of the pump and will turn black over time. The HEPA filters will have to be replaced once a year.

To access the filters open the top cover of the pump module. The two HEPA filters are identified in the figure below. The two filters can be replaced by disconnecting the soft tubing between the filters, pump, and the casing connectors.
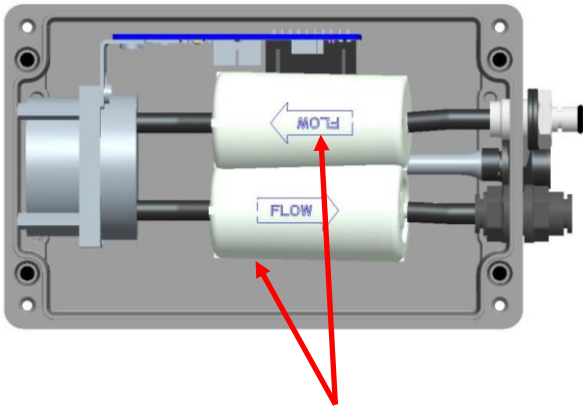
User Replaceable HEPA Filters

N O T E
When replacing the HEPA filters, make sure they are oriented in the correction direction as shown in the picture above.

Storage Precautions

When storing the DustTrak™ monitor for more than 30 days, you should charge and remove the batteries. This prevents damage due to battery leakage.

This instrument must be stored in a location where the temperature remains between –20 and 60°C (–4 and 140°F).

Chapter 5

Troubleshooting

The table below lists the symptoms, possible causes, and recommended solutions for common problems encountered with the DustTrak™ II monitor.

Symptom	Possible Cause	Corrective Action
Erratic zero reading.	Leak	Check connections for leaks Replace zero filter
	Dirty inlet port and/or sample tube	Clean inlet port. Clean or replace tubing
	Internal filter(s) not installed properly (leaking)	Inspect internal filter wells to make certain the filters and O-rings are seated properly. Replace internal filters if necessary
DustTrak reading negative concentrations	Zero Drift	Perform Zero Cal
	Zero Cal was performed without the Zero Filter in-line	Perform Zero Cal again and make sure the Zero Filter is attached to the DustTrak inlet
Error completing Zero Cal	Too much light scatter in the optics chamber due to dust deposits	Clean the inlet nozzle. Attach the zero filter and sample for about 2 minutes. During sampling, pulse the flow going into the DustTrak monitor by intermittently plugging the zero filter. Any dust in the optics chamber will break loose during flow pulsations and will be cleared out by the pump Perform Zero Cal again. If the Zero Cal still cannot be performed, factory service may be required

Symptom	Possible Cause	Corrective Action
Severe/sudden increase or decrease in mass concentration (greater than or equal to ~0.200 mg/m^3)	RF (radio frequency) signal transmitting in the area of the instrument causing electrical interference.	Determine the source and turn off the transmitter. Frequencies between 0.9 GHz to 1.7 GHz are known to interfere with the measurement. This spectrum includes aeronautical navigation aids, satellite communications, radio telescopes, and mobile radios. Relocate the instrument to a location where the interference is not present and normal operation resumes.
Run Mode Error: The start time has passed	The selected Run Mode program has "Use Start Date" selected, but the start date is prior to the current date	Correct or change the run mode program
Run Mode Error: The selected log mode will exceed the allowed number of samples	The selected Run Mode program is programmed to save more samples then is room in memory	Reduce the number of samples by reducing the test length or increasing the logging interval
Instrument runs slow	Large amount of data in memory	Large data files or many small data files will cause instrument to slow, due to need to read and display large amounts of data
No display	Unit not switched on	Switch unit on
	Low or dead batteries	Recharge the batteries or plug in the AC adapter

Symptom	Possible Cause	Corrective Action
No touch - screen response	Instrument currently busy	The instrument will take time to open large data files and save configuration information. During this time, the instrument will not respond to additional touchscreen touches
	Instrument Touchscreen is locked	If the lock in the title bar is red, unlock the instrument following the instructions in the Chapter 3, Operation: Title Bar section of this manual
Analog output does not work	Cable/connector not correctly installed	Make sure cable connector is fully seated
	Output wired with reverse polarity	Make sure analog out (+) and analog ground (-) are wired correctly to data-logger
Analog output is not in proportion to display	Analog output range in DustTrak™ monitor may be set incorrectly	Check analog output setting in the Setup->Analog screen. Make sure the channel of interest is selected. Make sure that the correct output (0 to 5V, 4 to 20 mA) is selected
	Data logger scaling factor may be set incorrectly	Review the scaling factor set in the Setup-Analog screen
Alarm output does not work	Alarm function not turned on	Turn the alarm function on in the Settings->Alarm screen
Alarm does not turn on correctly	Alarm setting incorrect	Check the alarm settings in the Settings->Alarm screen

Make sure the logging interval and time constant are set as short as possible (30 seconds or lower) |
	Alarm output wired with reverse polarity	Alarm wires are polarized. Voltage input must be wired to alarm input (+)
Instrument does not store new data	Memory is full	Delete or transfer historic data
	Instrument is in Survey mode	The instrument does not store data in survey mode. Can to manual or program log mode

Symptom	Possible Cause	Corrective Action
Flow Error is indicated on front screen	If sampling from a duct, instrument may have problems overcoming pressure differences	Attach both the input and the exhaust port into the duct
	Flow obstruction	Remove obstruction if still present. Press any key to bypass
	Internal pump failing, indicated by inability to adjust flow rate to full range	Factory service may be required
	Filter Cassette clogged or has mass loading	Replace the filter cassette. See the maintenance section of the manual
	External pump module (for Model 8530EP only) is not connected to the DustTrak™ monitor	Make sure both the External Pump cable and the flow tubing connector are connected to the DustTrak™ monitor and the External pump module. Lock the External Pump Cable in place by rotating the connector clockwise until you hear it snap in place
		Make sure the tubing between the DustTrak™ monitor and the External pump module is not kinked and is free of any sharp bends
		Make sure the exhaust adapter is connected to the exhaust of the DustTrak monitor
		Make sure the External Pump module filters are not clogged. If found dirty, replace the two HEPA filters
Laser Error indicated on front screen	Laser background is too high	Remove and clean inlet nozzle. Pay close attention to the tip of the nozzle that is inserted into the instrument to ensure it is clear of any contamination
	Laser is failing	Factory service may be required

Symptom	Possible Cause	Corrective Action
Filter Error indicated on front screen	Filters need to be replaced	Replaced the filters per instructions in the maintenance section of this manual. Make sure to reset the filter mass and date once the filters have been changed
		NOTE
		This is only a warning. The unit will continue to operate normally until the increase in pressure drop across the filter is so high that the pump can no longer maintain the set flow rate.
System Error has Occurred!	The processor did not receive the input it expected. This can also happen if the optics chamber is saturated with light, or the External Pump Cable is accidentally disconnected during the middle of sampling	Reboot the instrument. If the error does not go away, factory service is required

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Appendix A

Specifications

Specifications are subject to change without notice.

Sensor Type	90° light scattering
Range	8530 Desktop: 0.001 to 400 mg/m^3 8532 Handheld: 0.001 to 150 mg/m^3
Resolution	±0.1% of reading or 0.001 mg/m^3, whichever is greater
Zero Stability	±0.002 mg/m^3 24 hours at 10 sec time constant
Particle Size Range	Approximately 0.1 to 10 µm
Flow Rate	3.0 L/min set at factory 1.4 to 3.0 L/min adjustable
Flow Accuracy	±5% of factory set point Internal flow controlled
Temperature Coefficient	+0.001 mg/m^3 per °C
Operational Temperature	0 to 50°C
Storage Temperature	-20 to 60°C
Operational Humidity	0-95% RH, non-condensing
Time Constant	Adjustable 1 to 60 seconds
Data Logging	45 days at 1 minute samples
Log Interval	1 second to 1 hour
Physical Size (HWD)	Handheld: 4.9 x 4.75 x 12.45 in. Desktop: 5.3 x 8.5 x 8.8 in. External Pump: 4.0 x 7.5 x 3.5 in.
Weight	Handheld: 2.9 lb., 3.3 lb. with battery Desktop: 3.45 lb., 4.45 lb. – 1 battery, 5.45 lb. – 2 batteries External Pump: 3.0 lb.
Communications	8530: USB (Host and Device) and Ethernet. Stored data accessible using thumb drive 8532: USB (Host and Device). Stored dada accessible using thumb drive.

Power—DC	Handheld:	12 VDC at 2A
	Desktop:	24 VDC at 2.5A
Battery...........................	8530:	Up to 2 Removable Li-Ion
		External and Internal charging
		Life, 1 battery: >6.5 hours (9 hours typical for a new battery) for both internal and external pump Desktop DustTrak monitors
		Life, 2 battery: >13 hours
	8532:	1 Removable Li-Ion
		External and Internal charging
		Life: 5 hours typical
Analog out.....................	8530: User selectable output 0 to 5 V or 4 to 20 mA User selectable scaling	
Alarm Out......................	8530:	Relay or sound buzzer
		Relay
		No latching MOSFET
		User selectable set point
		5% deadband
		Connector 4-pin, Mini-DIN connectors
	8532:	Sound buzzer
Screen...........................	8530:	5.7" color touchscreen
	8532:	3.5" color touchscreen
Gravimetric Sampling....	8530:	Removable 37-mm Cartridge
EMI/RF Immunity	Complies with Emissions Directive Standard: EN50081-1:1992	
	Complies with Immunity Directive Standard: EN50082-1:1992*	

*ESD Shock may require instrument reboot

Appendix B

Zero Module

The Zero Module (P/N 801690) allows for automatic re-zeroing of the DustTrak™ Instrument during long sampling runs. The Zero Module works only with the 8530 desktop models.

Attach the AutoZero module to the main instrument in two steps.

1. Place the Zero module over the instrument's inlet and press down. The Zero module has an O-ring seal that will engage with the instrument's inlet.
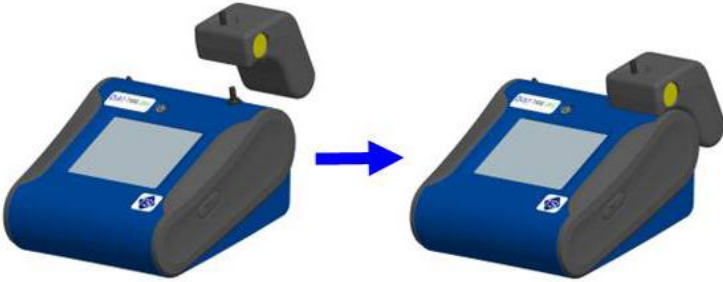

Figure B-1: Place Zero Module Over Inlet and Press Down

2. Attach the cable from the Zero module to the Zero module connector located on the back of the instrument.

Figure B-2: Zero Module Connector

The Zero Module can only be used in a program log mode. The Zero module function is controlled through these two program mode options:

Auto Zero Interval	Interval between re-zeroing the instrument using the Auto-Zero accessory.
Use Auto Zero	Select **Yes** to use the Zero Module. Select **No** to not use the Zero Module.

Important points on Zero Module operation:

- The Zero module will take one (1) minute to take a zero reading. The first 45 seconds of that period is used to clear the chamber of particles. Readings from last 15 second of the period, when the chamber is cleared of particles, will be averaged to determine the Zero offset.

- The log interval, when the Zero module is activated, must be two (2) minutes or greater. Data will not be recorded to the log file when the Zero module is activated.