

## 6.2 Technology Safety Data Sheet

<b>Technology Safety Data Sheet Cone Penetrometer Off Surface Sensor (TMS #: 3046, Version A)</b>		
<b>Section 1: Technology Identity</b>		
Technology Name(s):		Emergency Contact:
Cone Penetrometer Off Surface Sensor (CPOSS)		
Manufacturer's Name and Address:		Information Contact:
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Date Prepared:	TSDS Version Number:	Prepared By:
December 2001	TMS #: 3046, Version A	John J. Kovach, MS; Chip Booth, MS; Jeana Harrison; Bruce Lippy, CIH, CSP; Mary Jenison, MS
<b>Section 2: Technology Description</b>		
<p>The Cone Penetrometer (CP) is a subsurface monitoring technology used at the Savannah River Site to set contamination boundaries before remediation and to determine effectiveness after cleanup activities are complete. The CP system uses a large truck equipped with a hydraulic press to force an instrumented probe into the ground to depths of up to 200 feet. The tip and shaft of the penetrometer may be instrumented using a variety of probes to determine soil types, ground water location, and hazardous waste distribution.</p> <p>The Cone Penetrometer Off Surface Sensor (CPOSS) is used characterize the measurement and sampling errors introduced by the CP. The tool consists of the following components:</p> <ul style="list-style-type: none"> <li>• The control system, located in the truck during operation, allows the operator to deploy and retract the blades remotely as well as record the torque and position of the blades during deployment.</li> <li>• The linkage drive, located in the module, consists of the motor, ACME screw, and a linkage system responsible for deploying the blades containing the sensors</li> </ul> <p>The CPOSS module attaches to the CP and is approximately two feet in length and two inches in diameter. The tip of the tool is cone shaped. Two knife blades are mounted along the surface of the module. These blades, approximately three inches long, are deployed from one to three inches off the surface of the CP. During deployment, the knife blades with embedded sensors are rotated, thus, extending the tip of the blades away from the surface of the module.</p>		

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**Section 3: Technology Pictures**



Figure 1: Cone Penetrometer off surface sensor tool with extended blades.



Figure 2: The CPOSS Control System located in the truck during operation.



Figure 3: Cone Penetrometer truck used to deploy the CPOSS for subsurface characterization.

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**Section 4: Safety Hazards**

Hazard Category:

- 4 – Could result in death or permanent total disability
- 3 – Could result in permanent, partial disability or injuries or occupational illness that may result in hospitalization of at least three persons
- 2 – Could result in injury or occupational illness resulting in one or more lost work days
- 1 – Could result in injury or illness not resulting in a lost work day

A. Buried Utilities, Drums, and Tanks	Hazard Rating: 2
<ul style="list-style-type: none"> <li>• The CPOSS requires the Cone Penetrometer for deployment and the soil penetration depths can be up to 200 feet. Identify the location of underground obstructions to avoid hazards posed by these objects. Site-specific utility drawings and baseline environmental assessments, among others, should be considered when planning the deployment of this technology.</li> </ul>	
B. Chemical (Reactive, Corrosive, Pyrophoric, etc)	Hazard Rating: 1
<ul style="list-style-type: none"> <li>• The CPOSS may be exposed to chemical hazards during deployment. Evaluate the steam cleaning of the rods and the module during the extraction process for adequacy for each deployment site. Ensure the removal of chemical contamination, particularly between the blades and the barrel of the module. Handling of the module upon retrieval should be done with chemical resistant gloves specific for the wastes encountered.</li> </ul>	
C. Confined Space	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>• Confined Space is not part of this technology.</li> </ul>	
D. Electrical	Hazard Rating: 1
<ul style="list-style-type: none"> <li>• The power and signal cables associated with the CPOSS and the control system have the potential for pinching when the rods are screw-coupled and decoupled during the deployment and retrieval. There is a shock hazard when handling these leads if frayed or cut, and proper lockout/tagout procedures should be followed. The system should be de-energized during deployment and retrieval and when maintenance is performed.</li> </ul>	
E. Explosives	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>• Explosives are not part of this technology.</li> </ul>	
F. Fire Protection	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>• The fire protection plan for the Cone Penetrometer technology should cover operations of this vehicle. The CPOSS does not present any additional requirement.</li> </ul>	
G. Gas Cylinders	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>• Gas Cylinders are not part of this technology.</li> </ul>	
H. Ladders/Platforms	Hazard Rating: 1
<ul style="list-style-type: none"> <li>• Steps and platform approach to the truck is used for access to hydraulic ram section and data acquisition room of the Cone Penetrometer. Exercise care and use handrails for access and egress.</li> </ul>	
I. Lockout/Tagout	Hazard Rating: 1
<ul style="list-style-type: none"> <li>• The lockout/tagout procedures should be followed during setup, maintenance, and shut down.</li> </ul>	
J. Mechanical Hazards	Hazard Rating: 1
<ul style="list-style-type: none"> <li>• The potential for pinching fingers can occur when the module is attached to the Cone Penetrometer rod. Keep fingers away from screw coupling and wear gloves.</li> </ul>	
K. Moving Vehicles	Hazard Rating: 2
<ul style="list-style-type: none"> <li>• The Cone Penetrometer truck is a mobile unit and should only be operated by a qualified and trained driver. Driver must be aware of all workers in the vicinity as well as structures.</li> </ul>	

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L. Overhead Hazards	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Overhead Hazards are not part of this technology, but must be considered in the planned deployment of the penetrometer system for a specific site.</li> </ul>	
M. Pressure Hazards	Hazard Rating: 2
<ul style="list-style-type: none"> <li>Hydraulic pressures up to 17 tons are applied by the hydraulic drive on the ram when the penetrometer rods are inserted into the soil during the deployment of the CPOSS. When the ram drives the rods into the soil, there are guides that the ram slides against. In addition to the high pressure, there is potential for pinching a hand. Follow operating procedures and use safety glasses or face shields in the event of hydraulic line failure.</li> </ul>	
N. Slips/Trips/Falls	Hazard Rating: 2
<ul style="list-style-type: none"> <li>For the deployment of the CPOSS, as many as 65 three-foot long rods need to be screw-coupled when the module is deployed up to 200 feet. Manage hoses and connecting cables threaded through the rods to minimize the tripping hazards.</li> </ul>	
O. Suspended Loads	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Suspended Loads are not part of this technology.</li> </ul>	
P. Trenching/Excavation	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Trenching and Excavation are not part of this technology.</li> </ul>	
<b>Section 5: Health Hazards</b>	
A. Inhalation	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>This technology does not produce an inhalation hazard. Any inhalation hazards are site-specific and need to be evaluated as part of the deployment plan.</li> </ul>	
B. Skin Absorption	Hazard Rating: 1
<ul style="list-style-type: none"> <li>Contact with residual waste could possibly occur during the retrieval of the module. Steam cleaning is the usual method of decontamination. Inclusion of material can occur between the blades and the module. Specific contaminants need to be identified prior to deployment, and gloves suitable for the identified chemicals used. Information on protective equipment for specific chemicals can be found in the Material Safety Data Sheet, or glove manufacturers have listings of gloves for specific uses.</li> </ul>	
C. Noise	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>This technology does not produce noise. Workplace noise is generated when the module is deployed with the Cone Penetrometer. The work area should be surveyed during the deployment to evaluate the level of hearing protection required.</li> </ul>	
D. Heat Stress/Cold Stress	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>This technology does not have hot or cold surfaces; however, hot surfaces are generated at the coupling that steam cleans the rods as they are brought out of the ground. Heat stress could be a potential hazard when deployment occurs during very hot weather or when personal protective clothing is required. These need to be considered during the deployment planning process.</li> </ul>	
E. Ergonomic	Hazard Rating: 1
<ul style="list-style-type: none"> <li>The CPOSS is screw-coupled to the Cone Penetrometer rods for deployment. Some bending and twisting is involved when the module is attached.</li> </ul>	
F. Ionizing Radiation	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Ionizing Radiation is not part of this technology.</li> </ul>	
G. Non-ionizing Radiation	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Non-ionizing is not part of this technology.</li> </ul>	

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H. Biological Hazards	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>Biological Hazards are not part this technology. These hazards need to be considered specifically for the deployment site.</li> </ul>	
I. Other	Hazard Rating: N/A
<ul style="list-style-type: none"> <li>None</li> </ul>	
<b>Section 6: Phase Analysis</b>	
A. Construction/Start-up	
<ul style="list-style-type: none"> <li>Calibration and testing of the module for deployment will expose worker to sharp blade edges and the potential for electrical shock. The tool for calibration and testing should be secured, and hands should be kept away from sharp blade edge when extended. Approved procedures for testing and calibration and lock/tagout should be followed.</li> <li>Installation of the module on the Cone Penetrometer for deployment may expose workers to sharp edges and pinch points. When attaching the module to the penetrometer, the protective sleeve covering the blades should be in place before handling the module. Care must be exercised when screw coupling the module to the penetrometer rod to avoid pinching of the hand.</li> <li>Electrical shock may occur if the cable and signal leads become frayed or cut during the deployment. Inspection of the leads is necessary both during deployment and during retrieval to ensure integrity of the electrical wiring. Approved operating and lockout/tagout procedures should be followed.</li> </ul>	
B. Operation	
<ul style="list-style-type: none"> <li>Deployment of the CPOSS with the hydraulic ram exposes the worker to potential pinch points, high pressure, and electrical, ergonomic and tripping hazards. Exposure to pinch points can occur when the rods are screw-coupled together. Position the hands to avoid the screw connections when coupling the rods, and inspect the cables and leads when coupling each rod to check for pinched or frayed wire. Keep hands away from the hydraulic drive and guide – posts when pressure on the ram is applied. Good ergonomic positions should be used when making the screw coupled connections for the module and rods; the cable and hose should be bundled, secured, and managed to minimize tripping hazards.</li> <li>The CPOSS, when fully deployed, will expose the worker to the potential electrical hazards. Follow approved operating and lockout/tagout procedures, and use properly grounded outlets.</li> </ul>	
C. Maintenance (Emergency and Routine)	
<ul style="list-style-type: none"> <li>Decontamination of CPOSS is normally completed with high-pressure steam. Exposure to chemical wastes can occur. Use proper gloves, based upon the chemical properties identified in the MSDS when handling the module. Inspect CPOSS to ensure that no contamination is trapped between the blades and the module.</li> <li>Exposure to the blade edges can occur during maintenance, resulting in cuts or abrasions. The protective sleeve covering the blades and the tip should be in place when handling or transporting the module.</li> <li>Repair and replacement of CPOSS components could expose workers to electrical hazards. Inspection of all wiring for frays and cuts should be done, lockout/tagout procedures should be followed, and the module secured and immobilized when extending blades for bench testing.</li> </ul>	
D. Shutdown (Emergency and Routine)	
<ul style="list-style-type: none"> <li>Routine shutdown should follow approved procedures. This includes specific steps for de-energizing the power to the system, and the use of approved procedures for extraction of the module.</li> </ul>	

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<b>E. Decontamination/Decommissioning</b>
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- Normal decontamination of the rods and module uses high-pressure steam. Identify chemical waste properties so that additional decontamination procedures, if necessary, can be implemented. Use the MSDS for guidance on proper handling and ppe. Cleaning of the module for decommissioning needs to ensure that contamination between the blades and the module is removed. Wastes generated in the steam cleaning process must be disposed of according to approved methods.

<b>Section 7: Worker Protection Measures</b>
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<b>A. Exposure Monitoring</b>
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- Workplace noise is generated when the module is deployed with the Cone Penetrometer. This technology does not produce noise. The work area should be surveyed during the deployment to evaluate the level of hearing protection required.

<b>B. Worker Training</b>
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- Lockout/tagout procedures
- CPOSS operating procedures
- CPOSS maintenance procedures
- Hazard Communications
- Ergonomic training

<b>C. Medical Surveillance</b>
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- No additional surveillance is required resulting from the use of this technology.

<b>D. Engineering Controls</b>
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- No recommendation of additional controls beyond those incorporated into the current unit operation

<b>E. Administrative Controls</b>
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- Lockout/tagout procedures
- CPOSS operating procedures
- CPOSS maintenance procedures
- Hazard Communications

<b>F. Personal Protective Equipment</b>
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- Safety shoes
- Leather gloves
- Safety glasses
- Chemical resistant gloves

<b>Section 8: Emergency Preparedness</b>
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- Emergency response procedures should identify how the hazards noted in this TSDS are being addressed. Each worker should be trained and understand how to respond.

<b>Section 9: Comments, Lessons Learned, and Special Considerations</b>
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- None