

SECTION 6 - TECHNOLOGY SAFETY DATA SHEET

**TECHNOLOGY SAFETY DATA SHEET
TMR Associates Inc.
RadTrax**

SECTION 1: TECHNOLOGY IDENTITY	
<p>Manufacturer's Name and Address:</p> <p>Technical Mechanical Resources Associates Inc. 11575 West 13th Avenue Lakewood, CO 80215 303-202-1533 303-202-1566 Fax</p>	<p>Emergency Contact:</p> <p>Frank Fisher Vice President, TMR Associates, Inc. 303-202-1533</p>
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	<p>Date Prepared: February 2001</p>
<p>Other Names:</p> <p>None</p>	<p>Signature of Preparer:</p> <p>Operating Engineers National Hazmat Program 1293 Airport Road, Beaver, WV 25813 Phone 304-253-8674, Fax 304-253-1384</p> <p>Under cooperative agreement DE-FC21-95MC32260</p>

SECTION 2: PROCESS DESCRIPTION

RadTrax is a technology that was designed by TMR Associates Inc. and ThermoRetec as a platform capable of deploying radiological survey and mapping equipment. RadTrax can be equipped with a variety of radiological survey instruments capable of monitoring Alpha, Beta, Gamma, and Neutron particle radiation. Using a laser assisted ranging and data system (LARADS), RadTrax can completely survey contaminated walls, floors, and ceilings. Traveling at rates from two to four inches per second, all readings are immediately transmitted to the operator's computer for accurate "real time" measurements. RadTrax is able to survey all areas of a structure including walls, floors, and ceilings, thus eliminating the need for scaffolding erection for surveying purposes. RadTrax is operated remotely which means the operator controls the surveying from a portable console.

SECTION 3: TECHNOLOGY PHOTOS



Figure 1. RadTrax in operation in surrogate environment.



Figure 2. LARADS and RadTrax in operation.



Figure 3. RadTrax control box.



Figure 4. RadTrax without counterweight and survey head.

SECTION 4: CONTAMINANTS AND MEDIA

RadTrax is used for site characterization prior to the beginning of a remediation job. This implies the possibility of RadTrax entering a site that is of an unknown radiological condition. During retrieval and decontamination, surveying of RadTrax and protection of personnel is of the utmost importance.

SECTION 5: ASSOCIATED SAFETY HAZARDS

Probability of Occurrence of Hazard:

- 1 Hazard may be present but not expected over background level
- 2 Some level of hazard above background level known to be present
- 3 High hazard potential
- 4 Potential for imminent danger to life and health

A. ELECTRICAL (LOCKOUT/TAGOUT)**RISK RATING: 3**

Proper grounding and use of ground fault circuit interrupters is essential on all equipment. Compliance with applicable electrical standards and codes and lockout/tagout procedures must be followed to assure the safety of personnel. An emergency stop is needed on the operator's control box.

B. FIRE AND EXPLOSION**RISK RATING: N/A**

There is little risk from the normal operation of RadTrax, but the equipment was not intrinsically safe as observed and could not be used in a potentially explosive atmosphere.

C. CONFINED SPACE ENTRY**RISK RATING: 4**

Working with RadTrax in any work area that meets the definition of a confined space provides the potential for serious harm. All such projects must be planned carefully and compliance with OSHA standards is essential to protect workers.

D. MECHANICAL HAZARDS**RISK RATING: 4**

Operating RadTrax vertically poses increased risks of the telescoping boom releasing and falling on workers. However, this can be avoided by only allowing workers near RadTrax while the boom is retracted. Guarding the exposed chain and winch as observed are paramount objectives.

E. PRESSURE HAZARDS**RISK RATING: 3**

The air hoses present a potential struck by hazard if they were to rupture or disconnect.

F. TRIPPING AND FALLING**RISK RATING: 3**

The air and electrical lines connected to the operator's control box are of concern. They need to be highly visible and managed so that they do not prohibit movement of the operator.

G. LADDERS AND PLATFORMS**RISK RATING: N/A**

Not part of this technology.

SECTION 5: ASSOCIATED SAFETY HAZARDS (CONTINUED)	
H. MOVING VEHICLES	RISK RATING: 2-3
RadTrax is a mobile platform with significant weight. The area around RadTrax needs to be clearly visible to the operator and free of personnel.	
I. BURIED UTILITIES, DRUMS, AND TANKS	RISK RATING: N/A
Not part of this technology.	
J. PROTRUDING OBJECTS	RISK RATING: 2-3
RadTrax has a theodolite, out riggers, hoses, and survey head that protrude from the platform. These need to be marked for visibility to prevent striking/tripping hazard.	
K. GAS CYLINDERS	RISK RATING: N/A
Not part of this technology.	
L. TRENCHING AND EXCAVATIONS	RISK RATING: N/A
Not part of this technology.	
M. OVERHEAD LIFTS	RISK RATING: N/A
Not part of this technology.	
N. OVERHEAD HAZARDS	RISK RATING: 4
The operation of RadTrax vertically is accomplished by the telescoping boom and thus presents a 22 ft. overhead hazard. Tipping and tilting are of concern and personnel should not be allowed near RadTrax while the boom is in an extended position. Consequently, good work practices must be emphasized. Workers must be kept away from an extended RadTrax at all times.	

SECTION 6: ASSOCIATED HEALTH HAZARDS	
Probability of Occurrence of Hazard:	
1	Hazard may be present but not expected over background level
2	Some level of hazard above background level known to be present
3	High hazard potential
4	Potential for imminent danger to life and health
A. INHALATION HAZARD	RISK RATING: 1-4
During maintenance and repair operations, a radiological hazard exists. RadTrax needs to be surveyed and proper PPE needs to be worn by all personnel in the area during such operations.	
B. SKIN ABSORPTION	RISK RATING: 1-4
During maintenance and repair operations, a radiological hazard exists to skin penetration. RadTrax needs to be surveyed and proper PPE needs to be worn by all personnel in the area during such operations.	

SECTION 6: ASSOCIATED HEALTH HAZARDS (CONTINUED)	
C. HEAT STRESS	RISK RATING: 1
Technology does not produce a hazard but ambient conditions need to be considered.	
D. NOISE	RISK RATING: 1
Noise exposure at the point of operation is acceptable. Noise monitoring has shown values well below the OSHA permissible exposure limit for an 8-hour work shift. If any part of the system is replaced or repaired the results may vary.	
E. NON-IONIZING RADIATION	RISK RATING: 1
The tracking laser used is a Class II laser product (diode laser). It requires no special protection.	
F. IONIZING RADIATION	RISK RATING: 1-4
The areas in which RadTrax enters will contain varying quantities of radiological contaminants. Proper PPE is necessary to protect personnel during maintenance and decontamination.	
G. COLD STRESS	RISK RATING: 1
Technology does not produce a hazard but ambient conditions need to be considered.	
H. ERGONOMIC HAZARDS	RISK RATING: 3
The remote operation of RadTrax greatly reduces the stresses and strains on the body that are a normal part of surveying. During maintenance operations proper lifting techniques must be used. Repetitive motion is involved with the operator's control box. Rest breaks should be instituted to reduce associated muscular strain.	
I. OTHER	RISK RATING: 4
There is a need to vent the residual air pressure within the air system before any work on RadTrax is begun. An emergency stop is needed on the operator's control box to stop electrical and air potential.	

SECTION 7: PHASE ANALYSIS
A. CONSTRUCTION/START-UP
The setup phase requires the unloading of several boxes containing the various parts of RadTrax. The pieces of the equipment are manageable by two persons. Setting up the system also involves establishing electrical connections and connecting hoses for the air system. This phase presents several hazards including struck by/caught between hazards, pinch points, slips/trips/falls, and muscular/back injuries.

SECTION 7: PHASE ANALYSIS (CONTINUED)
B. OPERATION
The operational phase presents several hazards including: <ul style="list-style-type: none"> ▪ Potential risk from excessive pressure. ▪ Electrical shock. ▪ Pinch points associated with the changing of the survey head.
C. MAINTENANCE
Routine maintenance may require respiratory protection, depending on the radiological contaminants and the part of the system that is being worked on. Any maintenance work is particularly hazardous if RadTrax has entered a radiologically active area.
D. DECOMMISSIONING
The decommissioning phase presents several hazards including exposure to various radiological contaminants, pinch points, slips/trips/falls, and muscular/back injury.

SECTION 8: HEALTH AND SAFETY PLAN REQUIRED ELEMENTS
(If this technology is used on hazardous waste sites, the following information should be included in the written Health and Safety Plan that is required by OSHA under 29 CFR 1910.120.)
A. AIR MONITORING
Air monitoring of personnel exposures to radioactive materials is warranted; the results can document the PPE necessary for maintenance and retrieval operations. Since inhalation is the most frequent route of entry for radioactive materials, respiratory protection is of concern. Although RadTrax does not create any debris, air from the motors may disturb radioactive dust on surveyed surfaces.
B. WORKER TRAINING
Worker training is an important element in preventing injuries. Training in the operation of RadTrax is obviously important. Special emphasis should be placed on training workers to operate the controls of the operator's control box. Other safety and health training that may prove helpful for the workers include: <ul style="list-style-type: none"> ▪ RADWORKER I & RADWORKER II. ▪ HAZWOPER (Hazardous Waste Operations and Emergency Response). ▪ HAZCOM (Hazard Communication). ▪ Respiratory Protection. ▪ Hearing Conservation. ▪ Ergonomics (proper lifting, bending, stooping, kneeling). ▪ Heat Stress (learning to recognize signs and symptoms). ▪ Cold Stress (learning to recognize signs and symptoms). ▪ Personal Protective Equipment. ▪ Electrical Safety. ▪ Lockout/Tagout. ▪ Construction Safety (OSHA 500).

SECTION 8: HEALTH AND SAFETY PLAN REQUIRED ELEMENTS (CONTINUED)

(If this technology is used on hazardous waste sites, the following information should be included in the written Health and Safety Plan that is required by OSHA under 29 CFR 1910.120.)

C. EMERGENCY RESPONSE

Emergency response planning for a site needs to assure adequate coverage for hazards described in the TSDS. Having at least one worker per shift trained in CPR and first aid is recommended. The work crew should discuss the worst-case scenarios at each site and plans should be made on how to deal with each scenario.

D. MEDICAL SURVEILLANCE

A good general screening of the crew's health with emphasis on the back and cardiovascular/respiratory system is usually warranted. Depending on the contaminant present and the airborne levels, medical surveillance may be required by OSHA standards.

E. INFORMATIONAL PROGRAM

Workers must be trained in specific operation of equipment before use.

SECTION 9: COMMENTS AND SPECIAL CONSIDERATIONS

RadTrax technology is more protective of workers than standard surveying techniques. Only personnel who have been adequately trained should attempt to operate the technology.