1-Phenyl-1H-tetrazole-5-thiol

Material Safety Data Sheet

Hazard Alert Code
Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
1-Phenyl-1H-tetrazole-5-thiol

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C7-H6-N4-S, mercaptophenyltetrazole, 5-mercapto-1-phenyltetrazole, phenylmercaptotetrazole, 1-phenyl-5-mercaptotetrazole,
"1-phenyl-5-mercapto-1, 2, 3, 4-tetrazole", 1-phenyl-5-thiol

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>2</td>
<td></td>
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<tr>
<td>Reactivity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>2</td>
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</tbody>
</table>

CANADIAN WHMIS SYMBOLS

- Flammability Min/Nil=0, Low=1, Moderate=2, High=3, Extreme=4
EMERGENCY OVERVIEW

RISK
Heating may cause an explosion.
Harmful if swallowed.
Irritating to eyes, respiratory system and skin.
Highly flammable.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

EYE
- This material can cause eye irritation and damage in some persons.

SKIN
- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
- Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED
- The material can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

CHRONIC HEALTH EFFECTS
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
- Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
- Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>1-phenyl-1H-tetrazole-5-thiol</td>
<td>86-93-1</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

EYE
If this product comes in contact with the eyes
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
● Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
If skin contact occurs
● Immediately remove all contaminated clothing, including footwear.
● Flush skin and hair with running water (and soap if available).
● Seek medical attention in event of irritation.

INHALED
● If fumes or combustion products are inhaled remove from contaminated area.
● Lay patient down. Keep warm and rested.
● Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
● Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN
■ for poisons (where specific treatment regime is absent)

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BASIC TREATMENT
-----------------------------------------------
● Establish a patent airway with suction where necessary.
● Watch for signs of respiratory insufficiency and assist ventilation as necessary.
● Administer oxygen by non-rebreather mask at 10 to 15 L/min.
● Monitor and treat, where necessary, for pulmonary oedema.
Treat symptomatically.

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Section 5 - FIRE FIGHTING MEASURES
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<table>
<thead>
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<th>Vapor Pressure (mmHG)</th>
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<tbody>
<tr>
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<tr>
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<tr>
<td>Lower Explosive Limit (%)</td>
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</tr>
</tbody>
</table>

EXTINGUISHING MEDIA
For SMALL FIRES
Dry chemical, CO2, water spray or foam.
For LARGE FIRES
Water-spray, fog or foam.

FIRE FIGHTING
● Alert Fire Brigade and tell them location and nature of hazard.
● Wear breathing apparatus plus protective gloves.
● Prevent, by any means available, spillage from entering drains or water course.
● Fight fire from a safe distance, with adequate cover.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 1000 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
WARNING May EXPLODE on heating!!!
● Flammable solid which burns and propagates flame easily, even when partly wetted with water.
● Any source of ignition, i.e. friction, heat, sparks or flame, may cause fire or explosion.
● May burn fiercely
● May form explosive mixtures with air.
Combustion products include carbon dioxide (CO2), nitrogen oxides (NOx), sulfur oxides (SOx), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY
● Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result

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Section 6 - ACCIDENTAL RELEASE MEASURES
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MINOR SPILLS
● Remove all ignition sources.
● DO NOT touch or walk through spilled material.
● Clean up all spills immediately.
● Avoid contact with skin and eyes.

MAJOR SPILLS
● Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- DO NOT touch or walk through spilled material.
- Control personal contact by using protective equipment.

**Section 7 - HANDLING AND STORAGE**

**PROCEDURE FOR HANDLING**
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

**RECOMMENDED STORAGE METHODS**
For low viscosity materials and solids
Drums and jerricans must be of the non-removable head type.
Where a can is to be used as an inner package, the can must have a screwed enclosure. <

**STORAGE REQUIREMENTS**
FOR MINOR QUANTITIES
- Store in an indoor fireproof cabinet or in a room of noncombustible construction.
- Provide adequate portable fire-extinguishers in or near the storage area.

FOR PACKAGE STORAGE
- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
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<tbody>
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<td>1-phenyl-1H-tetrazole-5-thiol (Particles (Insoluble or Poorly Soluble) Not Otherwise)</td>
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<td>Canada - British Columbia Occupational Exposure Limits</td>
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<tr>
<td>US - Oregon Permissible Exposure Limits (Z-1)</td>
<td>1-phenyl-1H-tetrazole-5-thiol (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction)</td>
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<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>1-phenyl-1H-tetrazole-5-thiol (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**PERSONAL PROTECTION**
RESPIRATOR
- Particulate dust filter. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE
- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]. [AS/NZS 1336 or national equivalent]

HANDS/FEET
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include
- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
dexterity
- Wear physical protective gloves, eg. leather.
- Wear safety footwear.

OTHER
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

ENGINEERING CONTROLS
- For large scale or continuous use
- Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems
- Provide dust collectors with explosion vents

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
Does not mix with water.

<table>
<thead>
<tr>
<th>State</th>
<th>DIVIDED SOLID</th>
<th>Molecular Weight</th>
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<td>Melting Range (°F)</td>
<td>293 (decomposes)</td>
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<td>Boiling Range (°F)</td>
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<td>Solubility in water (g/L)</td>
<td>Partly miscible</td>
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<td>Flash Point (°F)</td>
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<td>pH (1% solution)</td>
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<tr>
<td>Decomposition Temp (°F)</td>
<td>Not Available</td>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
<td>Vapor Pressure (mmHG)</td>
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<tr>
<td>Upper Explosive Limit (%)</td>
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<td>Specific Gravity (water=1)</td>
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<tr>
<td>Lower Explosive Limit (%)</td>
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<td>Relative Vapor Density (air=1)</td>
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<tr>
<td>Volatile Component (%vol)</td>
<td>Not available</td>
<td>Evaporation Rate</td>
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</tr>
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</table>

APPEARANCE
Powder; does not mix well with water.
Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

STORAGE INCOMPATIBILITY
- High nitrogen compounds are often unstable or explosive; the tendency is exaggerated by attachment of azide or diazonium groups, or a high-nitrogen heterocyclic nucleus.
- High-nitrogen chemical families include:
  - azides
  - diazoazoles
  - diazonium salts
  - hydrazinium salts
- Avoid reaction with oxidizing agents
- There is a wide variation in thermal stability in derivatives of tetrazole (which contains a high-nitrogen nucleus) and several show explosive properties.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

1-phenyl-1H-tetrazole-5-thiol

TOXICITY AND IRRITATION
- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
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</thead>
<tbody>
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<td>1-phenyl-1H-tetrazole-5-thiol</td>
<td>HIGH</td>
<td>No Data Available</td>
<td>LOW</td>
<td>HIGH</td>
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Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions
A. General Product Information
   Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

Disposal Instructions
   All waste must be handled in accordance with local, state and federal regulations.
   - Containers may still present a chemical hazard/ danger when empty.
   - Return to supplier for reuse/ recycling if possible.
   Otherwise:
   - If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
   - Where possible retain label warnings and MSDS and observe all notices pertaining to the product.
   Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:
   - Reduction
   - Reuse
   - Recycling
   - Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.
DO NOT allow wash water from cleaning or process equipment to enter drains.
It may be necessary to collect all wash water for treatment before disposal.
In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
Where in doubt contact the responsible authority.
Recycle wherever possible.
Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

### Section 14 - TRANSPORTATION INFORMATION

**DOT:**

<table>
<thead>
<tr>
<th>Symbols:</th>
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<tr>
<td>Hazard class or Division:</td>
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<table>
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<tr>
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<tr>
<td>PG:</td>
<td>II</td>
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<table>
<thead>
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<td>Special provisions:</td>
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<table>
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<th>Packaging: Exceptions:</th>
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<tbody>
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<td>Packaging: Non-bulk:</td>
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<table>
<thead>
<tr>
<th>Packaging: Exceptions:</th>
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<tbody>
<tr>
<td>Quantity limitations:</td>
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<table>
<thead>
<tr>
<th>Quantity Limitations: Cargo aircraft only:</th>
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<tr>
<td>Vessel stowage: Location:</td>
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</table>

| Vessel stowage: Other: | None |

**Hazardous materials descriptions and proper shipping names:**
Flammable solids, organic, n.o.s.

**Air Transport IATA:**

<table>
<thead>
<tr>
<th>ICAO/IATA Class:</th>
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<tbody>
<tr>
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<tr>
<td>Packing Group:</td>
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| Special provisions: | A3 |

**Cargo Only**

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<table>
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Shipping name: FLAMMABLE SOLID, ORGANIC, N.O.S.(contains 1-phenyl-1H-tetrazole-5-thiol)

**Maritime Transport IMDG:**

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</table>

Shipping name: FLAMMABLE SOLID, ORGANIC, N.O.S.(contains 1-phenyl-1H-tetrazole-5-thiol)

### Section 15 - REGULATORY INFORMATION

1-phenyl-1H-tetrazole-5-thiol (CAS: 86-93-1) is found on the following regulatory lists:
"Canada Domestic Substances List (DSL)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"
LIMITED EVIDENCE

- Cumulative effects may result following exposure*.
  * (limited evidence).

**Denmark Advisory list for selfclassification of dangerous substances**

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<tr>
<th>Substance</th>
<th>CAS</th>
<th>Suggested codes</th>
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<td>1- phenyl- 1H- tetrazole- 5- thiol</td>
<td>86- 93- 1</td>
<td>Xn; R22</td>
</tr>
</tbody>
</table>

- Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

  A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

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