



EMERGENCIAS EN DEPÓSITOS DE GRANO

CONOCIMIENTO

RESEÑA

Las operaciones de agricultura pueden ser peligrosas por naturaleza. Evitar accidentes, y sobrevivir si uno ocurriera, ambos requieren entrenamiento. Esta presentación le capacita para reconocer peligros comunes que existen durante las operaciones de depósitos de grano, entender los pasos que reducen o eliminan estos peligros, e identificar acciones iniciales que deben tomarse en caso de un accidente en instalaciones de manejo de grano.

[Oklahoma State University – Fire Service Training](#)
Conocimiento de Emergencias en Depósitos de Grano

Slide 1



El 23 de marzo de 2009, Nolan Schmidt, jefe de bomberos voluntarios para el departamento de bomberos de Hydro, Oklahoma, murió batallando un incendio dentro de un depósito de grano en Hydro. Jefe de Bomberos Schmidt fue uno de por lo menos cinco bomberos que descendieron a un depósito medio lleno de soya ardiente. Más tarde sus compañeros cortaron el lado del depósito de metal para sacar a Schmidt y a cuatro colegas más, quienes habían sido agobiados por el humo denso.

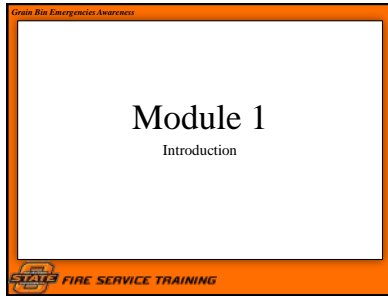
Jefe Schmidt y los miembros de su departamento de bomberos fueron enviados a un reporte de un posible incendio dentro de un depósito grande de grano. Los bomberos entraron al depósito para investigar. Jefe Schmidt mandó a los bomberos a salir. Para salir, los bomberos tenían que subir por una escalera larga. Uno de los bomberos dentro del depósito estaba fatigado y no podía hacer el ascenso. Jefe Schmidt entró al depósito para ayudarlo. Posteriormente ambos bomberos quedaron inconscientes.

Los bomberos en el exterior cortaron un agujero en la pared del depósito y sacaron a los dos bomberos. Jefe Schmidt fue llevado al hospital pero había fallecido. La causa de muerte fue dada como asfixia debido a probable toxicidad de monóxido de carbono.

Los accidentes ocurren en cada ocupación. Cuando ocurren en operaciones de agricultura o en respuesta a una emergencia, estos accidentes pueden ser desastrosos. Esta presentación tiene el propósito de prevenir que ocurran tales incidentes.

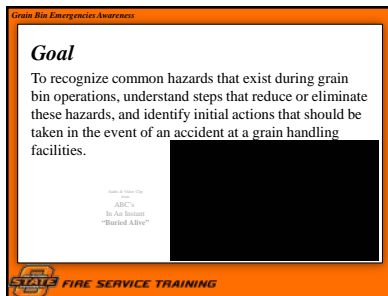
Material para el estudiante

Slide 2



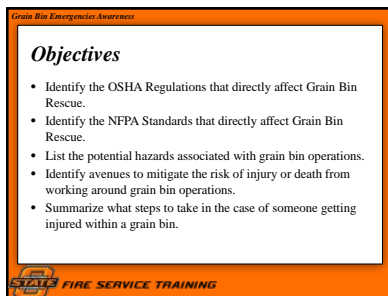
INTRODUCCIÓN

Slide 3



META

Slide 4



OBJETIVOS


Material para el estudiante

Slide 5

Grain Bin Emergencies Awareness

ACTIVITY 1.1

- Name
- Employer
- Related Experience
- Current assignment and responsibilities
- Family
- Hobbies

 FIRE SERVICE TRAINING


ACTIVIDAD

Slide 6

Grain Bin Emergencies Awareness

WARNING!

Agriculture operations by nature can be inherently dangerous. The best way to avoid injuries and death comes from training, experience, proper use of equipment, repeated practice, and sound judgment. It is up to you to obtain competent instruction and practice sound safety procedures.


 FIRE SERVICE TRAINING

¡PRECAUCIÓN!

Las operaciones de agricultura pueden ser peligrosas por naturaleza.


Slide 7

Grain Bin Emergencies Awareness

OSHA Regulations 

29 CFR 1910.272 – Grain Handling Facilities

- 29 CFR 1910.272 App A – Grain Handling Facilities
- 29 CFR 1910.272 App B – National Consensus Standards
- 29 CFR 1910.272 App C – References for Further Information

 FIRE SERVICE TRAINING

Reglamentos de OSHA

Material para el estudiante


Slide 8

Grain Bin Emergencies Awareness

Rescue Standards

NFPA 1670 (2009 edition) (Organization Standard) – Standard on Operations and Training for Technical Search and Rescue Incidents
Awareness
Operations
Technician

NFPA 1006 (2008 edition) (Individual Standard) – Standard for Technical Rescuer Professional Qualifications
Technician Level I
Technician Level II






Normas de NFPA


Slide 9

Grain Bin Emergencies Awareness

NFPA 1670



- Standard on Operations and Training for Technical Search and Rescue Incidents (2014 Edition)
 - Awareness
 - Operations
 - Technician



9


NFPA 1670

Slide 10

Grain Bin Emergencies Awareness

Other Standard Setting Organizations

- The National Institute of Occupational Safety and Health (NIOSH) www.cdc.gov/niosh
- The American Society for Testing and Materials (ASTM) www.astm.org
- The American National Standards Institute (ANSI) www.ansi.org
- American Society of safety Engineers (ASSE) www.asse.org



Otras normas

Material para el estudiante

Slide 11

Grain Bin Emergencies Awareness

Agricultural – Danger, Disability, Death

- 60 + corporate grain handling facility sites operating in Oklahoma
- Oklahoma Farms 2012 Census
 - Number of Farms in Oklahoma 85,000
 - Land in Production 34,800,000 acres
 - Cash Receipts From Farms \$7,038,174,000

STATE FIRE SERVICE TRAINING

Agricultura – Peligro, Desmembramiento, Muerte

Slide 12

Grain Bin Emergencies Awareness

Grain Bins and Facilities

- Bins
- Flat Storage
- Gravity Wagons
- Grain Buggies
- Hopper Bottom Trailers

STATE FIRE SERVICE TRAINING

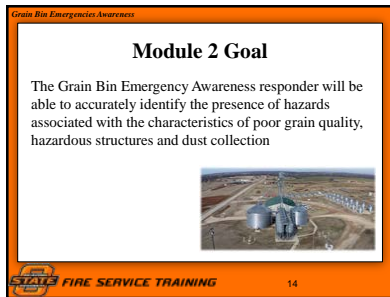
Instalaciones y depósitos de grano

Slide 13



Módulo 2 – Calidad del grano

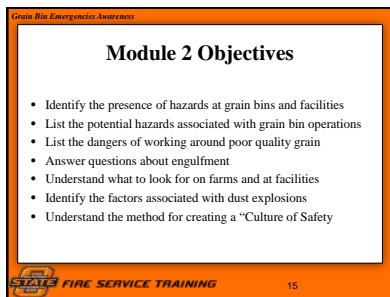
Slide 14



Module 2: Meta

El respondedor de nivel Conocimiento de Emergencias en Depósitos de Grano podrá identificar correctamente la presencia de los riesgos asociados con las características de grano de mala calidad, estructuras peligrosas y la colección de polvo.

Slide 15



Module 2: Objetivos

Identificar la presencia de riesgos en depósitos e instalaciones de grano

Enumerar los peligros posibles asociados con las operaciones de depósitos de grano

Enumerar los peligros de trabajar alrededor de grano de mala calidad

Responder a preguntas sobre el hundimiento

Entender qué hay que averiguar en las granjas e instalaciones

Identificar los factores asociados con las explosiones de polvo

Entender el método para crear una “Cultura de Seguridad”

Slide 16

Grain Bin Emergencies Awareness

The Facts

- ❑ Farming...in the top 5 on US Bureau of Labor Standards' list of most dangerous occupations (adults and children)
- ❑ Estimated 300+ children die each year in farming accidents in the USA
- ❑ Under 16 years old account for 20% of farm fatalities
- ❑ Not to mention permanent disabilities (estimated 1000 each year)

STATE FIRE SERVICE TRAINING

Los datos

Slide 17

Grain Bin Emergencies Awareness

Agricultural – Danger, Disability, Death

Age Group	Deaths	Type of Injury Event	Deaths
15-19	132	Overturning vehicle/machine	1,051
20-24	166	Fall from & runover by veh/mach.	298
25-34	408	Caught in running equipment	277
35-44	577	Struck by falling object	234
45-54	578	Run over (pedestrian)	211
55-64	754	Fall to lower level	173
65+	1,363	Struck by rolling object	136
Total	4,082	Assault by animal	129
		Suicide	88
		Caught in collapsing material	80
		All other events	1,405

Agricultural Production: Death Rate between 2002-2012

Information taken from the Census of Fatal Occupational Injuries


STATE FIRE SERVICE TRAINING

Agricultura – Peligro, Incapacidad, Muerte

Slide 18

Grain Bin Emergencies Awareness

Agricultural – Danger, Disability, Death



- What can we do to lower these numbers?
- Awareness thru education and interaction?
- FFA
- 4H
- Farm, Ranch and Rural Publications

STATE FIRE SERVICE TRAINING

Agricultura – Peligro, Incapacidad, Muerte

¿Qué se puede hacer?

Slide 19

Grain Bin Emergencies Awareness

Grain Handling

- 2010-11 ... 50+ entrapments and 24 deaths
- This year (14-15) on target to exceed that..
- 77% of grain bin incident victims are unloading bins... *with out-of-condition grain.*
- Trapped in 4-5 seconds, buried in 20 seconds.

STATE FIRE SERVICE TRAINING

Manejo de grano

Slide 20

Grain Bin Emergencies Awareness

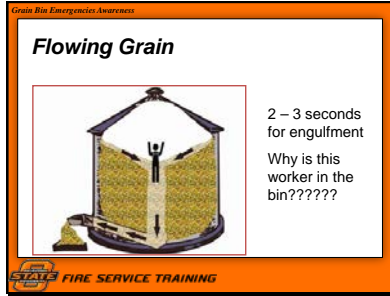
How does it happen?

- Three ways it can happen; all are associated with unloading *poor quality grain:*
 - Flowing Grain
 - Collapse of a Grain Bridge
 - Avalanche of a Vertical Grain Wall
- Grain Bin or Gravity Wagon...
 - Trapped in 4-5 sec, buried in 20 sec!!!

STATE FIRE SERVICE TRAINING

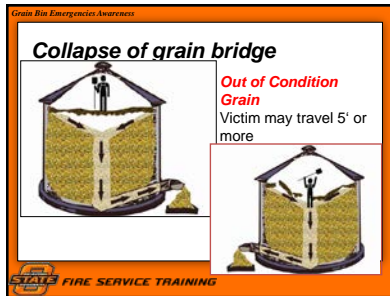
¿Cómo ocurre?

Slide 21



Grano en movimiento

Slide 22



Colapso de puente de grano

Slide 23



Avalancha de pared de grano

Material para el estudiante

Slide 24

Grain Bin Emergencies Awareness

If Grain is in good condition....

- Reclaim systems work properly
- No need to enter the bin!!!**
- If workers aren't in the bin, entrapment doesn't happen!

STATE FIRE SERVICE TRAINING

Si el grano está en buena condición....

Slide 25

Grain Bin Emergencies Awareness

**Major Cause:
Out-of-Condition Grain!!!!**



STATE FIRE SERVICE TRAINING

Causa principal:

Slide 26

Grain Bin Emergencies Awareness

What to look for...

- Poor grain quality going into the bin
- Quality **NEVER** improves in storage
- Management of temperature changes and moisture

STATE FIRE SERVICE TRAINING

¿Qué hay que observar...?

Slide 27



Problemas de manejo de humedad

Slide 28

- What to look for...*
- Leaky structures
 - Aeration systems not designed properly
 - Aeration system mismanagement
 - Temperature cable malfunctions
- STATE FIRE SERVICE TRAINING

¿Qué observar...?

Slide 29



Ventilas de techo o extractores tapados o inadecuados

Material para el estudiante

Slide 30

Grain Bin Emergencies Awareness

What to look for...

- Insect Activity



- Do you know your bugs???

STATE FIRE SERVICE TRAINING

¿Qué observar...?

Slide 31

Grain Bin Emergencies Awareness

What to look for...

- Poor sanitation practices
- Reclaim system malfunction or poor design
- **Inadequate dust management**

STATE FIRE SERVICE TRAINING

¿Qué observar...?

Slide 32

Grain Bin Emergencies Awareness

Be Prepared

- Use proper equipment if you do have to enter a bin
 - Harness
 - Anchor Points in Bins
 - Bin Entry Kit
 - How about the air quality???
 - Lock out Tag out... ALWAYS!
- **Never...ever....ever.... work alone!**

STATE FIRE SERVICE TRAINING

Esté preparado

Slide 33

Grain Bin Emergencies Awareness

What to look for...

- Poor sanitation practices
- Reclaim system malfunction or poor design
- AND.....
- Inadequate dust management

ESTATES FIRE SERVICE TRAINING

¿Qué observar...?

Slide 34

Grain Bin Emergencies Awareness

And what about explosions?
Requires 5 things...**ALWAYS!**



Fuel Ignition
Dispersion Confinement
Oxygen

Adapted from CSB

ESTATES FIRE SERVICE TRAINING

¿Y qué de las explosiones?

Slide 35

Grain Bin Emergencies Awareness

And what about explosions?



Dust Dust settles on flat surfaces

Some event disturbs the settled dust into a cloud

Dust cloud is ignited and explodes

Adapted from CSB

ESTATES FIRE SERVICE TRAINING

¿Y qué de las explosiones?

Material para el estudiante

Slide 36



¿Cuál bombilla?

Slide 37



Foto digital

Slide 38



El remedio

Slide 39

Grain Bin Emergencies Awareness

Dust Control

- 1/8th inch maximum in priority areas
- Vacuum preferred with unit outside
- Compressed air only when ignition sources in the area removed or controlled



STATE FIRE SERVICE TRAINING

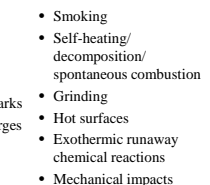
Control de polvo

Slide 40

Grain Bin Emergencies Awareness

Potential Ignition Sources

- Lightning strikes
- Open Flames
- Welding
- Cutting
- Electric Arcs and sparks
- Electrostatic Discharges
- Frictional heating
- Smoking
- Self-heating/ decomposition/ spontaneous combustion
- Grinding
- Hot surfaces
- Exothermic runaway chemical reactions
- Mechanical impacts



STATE FIRE SERVICE TRAINING


Fuentes potenciales de ignición

Slide 41

Grain Bin Emergencies Awareness

The Remedy?

Eliminate heat source



STATE FIRE SERVICE TRAINING

El remedio

Slide 42



El remedio

Slide 43



Cámara de polvo

Slide 44



Polvo (en cámara lenta)

Material para el estudiante

Slide 45

Grain Bin Emergencies Awareness

The Remedy?

In other words...

- Keep grain in good condition
- Maintenance
- Caution and Training

Be informed.....

STATE FIRE SERVICE TRAINING

El remedio

Slide 46

Grain Bin Emergencies Awareness

NOT a "Culture of Safety"

- Rushed work habits
- Seasonal or young workers with little training
- "Seasoned" workers getting sloppy
- Lack of a "safety culture"

STATE FIRE SERVICE TRAINING

Lo que NO es una "Cultura de seguridad"

Slide 47

Grain Bin Emergencies Awareness

How do we fix it...

- Develop "Safety Always" mindset
- Follow Best Management Practices
- Train yourself, workers and family
- Brain storm and talk about "what-ifs"

STATE FIRE SERVICE TRAINING

¿Cómo lo arreglamos?

Material para el estudiante

Slide 48

Grain Bin Emergencies Awareness

How do we fix it...

Focus on the details....
Manage **GRAIN QUALITY**
AND Be Prepared through

- Communication....
- Teamwork...
- Training.....it's **EVERYONE'S** job

OKSTATE FIRE SERVICE TRAINING

¿Cómo lo arreglamos?

Slide 49

Grain Bin Emergencies Awareness

If Grain is in good condition....

Accidents can be prevented

The only good accident is one that is prevented

AND....we have a product to sell...for more \$\$\$

OKSTATE FIRE SERVICE TRAINING

Si el grano está en buena condición....

Slide 50

Grain Bin Emergencies Awareness

Questions?
Jcarol@okstate.edu



Home of World-Class Stored Product Research
Stillwater, Oklahoma

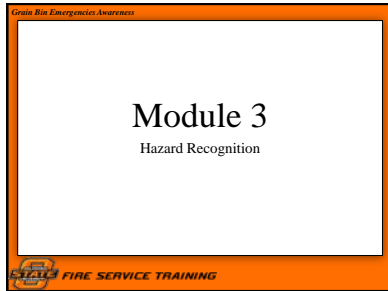
OKSTATE FIRE SERVICE TRAINING

Dr. Carol L. Jones

Dr. Carol L. Jones es actualmente una profesora asociada en el Biosystems and Agricultural Engineering Department en Oklahoma State University. Su nombramiento a la facultad de BAE comenzó en 2006 después de más de 25 años en los campos de energía y agricultura. Su área de investigación, extensión y enseñanza es en tecnología posterior a la cosecha y el manejo de materiales de productos biológicos.

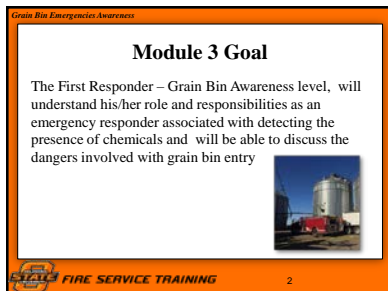
Si tiene preguntas adicionales sobre la condición de grano y su almacenamiento correcto puede comunicarse con la Dra. Jones a Jcarol@okstate.edu.

Slide 51



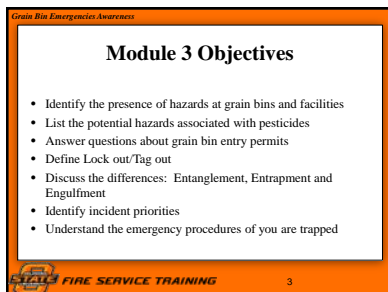
MÓDULO 3

Slide 52



Módulo 3: Meta

Slide 53




Módulo 3: Objetivos

Slide 54

Grain Bin Emergencies Awareness

Pesticides

- NASS survey shows only 15% of grain was treated
- PDP surveys show 80-91% of the grain had detectable residues



SEATTLE FIRE SERVICE TRAINING


Pesticidas

Slide 55

Grain Bin Emergencies Awareness

Pesticides

- Aluminum Phosphide
- Chlorpyrifos-methyl (Reldan)
- Lindane (seed treatments)
- Diatomaceous earth



SEATTLE FIRE SERVICE TRAINING

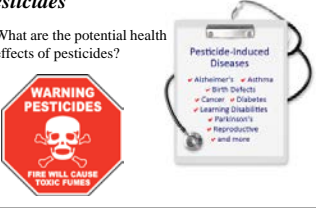
Pesticidas

Slide 56

Grain Bin Emergencies Awareness

Pesticides

- What are the potential health effects of pesticides?



WARNING PESTICIDES
FIRE WILL CAUSE TOXIC FUMES

Pesticide-Induced Diseases

- Alzheimer's
- Asthma
- Birth Defects
- Cancer
- Diabetes
- Learning Disabilities
- Parkinson's
- Reproductive
- and more

SEATTLE FIRE SERVICE TRAINING

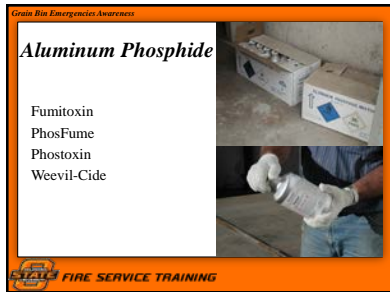
Pesticidas

Slide 57



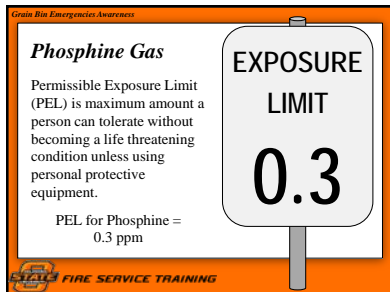
Peligros químicos

Slide 58



Aluminum Phosphide (fosfuro de aluminio)

Slide 59



Phosphine Gas (gas fosfeno)


Material para el estudiante

Slide 60

Grain Bin Emergencies Awareness

Health Effects

- Once a toxic substance has contacted the body it may have either acute (*immediate*) or chronic (*long term*) effects.
Example: Spilling acid on your hand will cause *immediate harm*, i.e. a burn to the skin.




FIRE SERVICE TRAINING

Efectos sobre la salud

Slide 61

Grain Bin Emergencies Awareness

Material / Safety Data Sheets



Safety Data Sheets (SDS) contain information on the product's ingredients as well as outlining emergency procedures. SDS should be read and understood before using hazardous chemicals and kept readily accessible in case of an emergency.


FIRE SERVICE TRAINING

Material/Safety Data Sheets (hojas de datos de seguridad de materiales)
Vea el ejemplo de SDS adjunto

Slide 62

Grain Bin Emergencies Awareness

Routes of Entry



FIRE SERVICE TRAINING

Rutas de entrada

Material para el estudiante

Slide 63



Peligros eléctricos

Slide 64



Peligros de caída

Slide 65




Equipo para mover grano

Slide 66

Grain Bin Emergencies Awareness

Oxygen Deficient Atmospheres

23.5%	Maximum for Safe Entry
20.9%	Normal Oxygen Level In Air
19.5%	Minimum for Safe Entry
16%	Impaired Judgment and Breathing
14%	Faulty Judgment, Rapid Fatigue
6%	Difficulty Breathing – Death Within Minutes




Atmósfera deficiente en oxígeno


Slide 67

Grain Bin Emergencies Awareness

Testing the Atmosphere

- Never trust your senses!
- Many toxic gases are odorless and cannot be seen.
- The level of oxygen can not be determined without a monitoring device.
- Test from Outside – Top to Bottom





Analizar la atmósfera

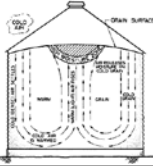
Slide 68


Grain Bin Emergencies Awareness

Bin Aeration Systems

Grain bins are commonly equipped with aeration systems which:

- Cool grain for safe storage
- Dry grain
- Prevent moisture accumulation
- Reduce loss to insect damage





Sistemas de aereación del depósito

Slide 69

Grain Bin Emergencies Awareness

Characteristics of a Confined Space

DANGER

CONFINED SPACE
Atmospheric Hazards, Limited Entry/Exit, and Other Safety Hazards

DO IT SAFELY!

- Oxygen less than 19.5%
- Present/Potential flammable
- Combustible or explosive atmospheres
- Present/Potential toxic atmospheres
- Engulfment
- Area not protected against entry of substances which create possible hazards
- Poor natural ventilation
- Restricted entry for rescue

DO IT SAFELY!

- 1. Perform a written permit check
- 2. Use an authorized person
- 3. Lockout/Tagout equipment
- 4. Ventilate
- 5. Use a safety harness
- 6. Use a lifeline
- 7. Use a rescue team
- 8. Use a rescue kit
- 9. Use a rescue plan
- 10. Use a rescue team
- 11. Use a rescue kit
- 12. Use a rescue plan
- 13. Use a rescue team
- 14. Use a rescue kit
- 15. Use a rescue plan
- 16. Use a rescue team
- 17. Use a rescue kit
- 18. Use a rescue plan
- 19. Use a rescue team
- 20. Use a rescue kit
- 21. Use a rescue plan
- 22. Use a rescue team
- 23. Use a rescue kit
- 24. Use a rescue plan
- 25. Use a rescue team
- 26. Use a rescue kit
- 27. Use a rescue plan
- 28. Use a rescue team
- 29. Use a rescue kit
- 30. Use a rescue plan
- 31. Use a rescue team
- 32. Use a rescue kit
- 33. Use a rescue plan
- 34. Use a rescue team
- 35. Use a rescue kit
- 36. Use a rescue plan
- 37. Use a rescue team
- 38. Use a rescue kit
- 39. Use a rescue plan
- 40. Use a rescue team
- 41. Use a rescue kit
- 42. Use a rescue plan
- 43. Use a rescue team
- 44. Use a rescue kit
- 45. Use a rescue plan
- 46. Use a rescue team
- 47. Use a rescue kit
- 48. Use a rescue plan
- 49. Use a rescue team
- 50. Use a rescue kit
- 51. Use a rescue plan
- 52. Use a rescue team
- 53. Use a rescue kit
- 54. Use a rescue plan
- 55. Use a rescue team
- 56. Use a rescue kit
- 57. Use a rescue plan
- 58. Use a rescue team
- 59. Use a rescue kit
- 60. Use a rescue plan
- 61. Use a rescue team
- 62. Use a rescue kit
- 63. Use a rescue plan
- 64. Use a rescue team
- 65. Use a rescue kit
- 66. Use a rescue plan
- 67. Use a rescue team
- 68. Use a rescue kit
- 69. Use a rescue plan
- 70. Use a rescue team
- 71. Use a rescue kit
- 72. Use a rescue plan
- 73. Use a rescue team
- 74. Use a rescue kit
- 75. Use a rescue plan
- 76. Use a rescue team
- 77. Use a rescue kit
- 78. Use a rescue plan
- 79. Use a rescue team
- 80. Use a rescue kit
- 81. Use a rescue plan
- 82. Use a rescue team
- 83. Use a rescue kit
- 84. Use a rescue plan
- 85. Use a rescue team
- 86. Use a rescue kit
- 87. Use a rescue plan
- 88. Use a rescue team
- 89. Use a rescue kit
- 90. Use a rescue plan
- 91. Use a rescue team
- 92. Use a rescue kit
- 93. Use a rescue plan
- 94. Use a rescue team
- 95. Use a rescue kit
- 96. Use a rescue plan
- 97. Use a rescue team
- 98. Use a rescue kit
- 99. Use a rescue plan
- 100. Use a rescue team

FIRE SERVICE TRAINING

Características de un espacio confinado


Slide 70

Grain Bin Emergencies Awareness

Lockout/Tagout

Except for fans and lighting, turn off and lock out all powered equipment:

- Heaters
- Augers
- Conveyer belts
- Other grain moving equipment



FIRE SERVICE TRAINING

Lockout/Tagout (interrupción de energía con candado y etiqueta)


Slide 71

Grain Bin Emergencies Awareness

Grain Bin Entry and Permits

Never enter a bin without a "bin entry permit"

- Lockout/Tag Out energy sources
- Perform atmospheric monitoring
- Use a safety harness and lifeline
- Provide adequate lighting
- Train for safe entry and emergency egress
- ALWAYS have someone monitoring the entry from outside the bin



FIRE SERVICE TRAINING

Entrada a depósitos de grano y permisos

Material para el estudiante

Slide 72



Enredo

Slide 73



Quedarse atrapado

Slide 74



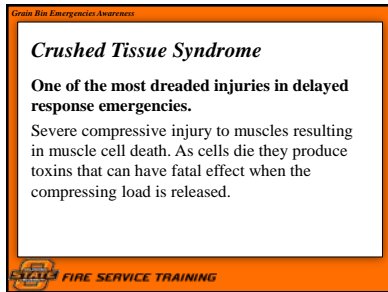
Hundimiento en grano

Slide 75



¿Cómo ocurre el hundimiento?

Slide 76



Síndrome de tejido aplastado

Slide 77



Prioridades en el incidente

Slide 78

Grain Bin Emergencies Awareness

Factors Leading To Poor Decisions

Accidents are normally caused by a chain of events. Many of these events are the result of POOR DECISIONS. Factors leading to POOR DECISIONS include:

"THE DIRTY DOZEN"

Lack of Communication	Complacency
Lack of Knowledge	Distractions
Lack of Teamwork	Fatigue
Lack of Resources	Pressure
Lack of Assertiveness	Stress
Lack of Awareness	Norms

SEATTLE FIRE SERVICE TRAINING

Factores que llevan a malas decisiones

Slide 79

Grain Bin Emergencies Awareness

Mode of Operation

- Rescue
- Recovery
- Unknown

"CHECK SIX"



SEATTLE FIRE SERVICE TRAINING

Modos de operación


No deje zonas ciegas; ¡Revise su Seis!

Slide 80

Grain Bin Emergencies Awareness

Emergency Actions

If YOU Are Trapped



- If you're sinking up to your chest – cross your arms in front of your chest so that you can breathe
- Placing a light cloth over your face to keep grain and dust out of your airway
- Do not continue to struggle against grain. Additional movement can pack the grain tighter around your body.
- Stay calm and listen for the arrival of help.

SEATTLE FIRE SERVICE TRAINING

Si usted queda atrapado

Material para el estudiante

Slide 81


Grain Bin Emergencies Awareness

Emergency Actions

If SOMEONE ELSE is Trapped

Time is of the essence.

- TURN OFF all augers, off-loading equipment, and heaters.
- Call 911 and summon any help near you.
- If bin fans are on, leave them on.
- DO NOT enter the bin alone.



FFS FIRE SERVICE TRAINING


Si alguien más queda atrapado

Slide 82

Grain Bin Emergencies Awareness

Rescue Procedures

- Be sure auger is off
- Ventilate the bin with bin ventilation fan
- Turn on fan only
- Don't activate heat source
- Trapped victims may survive total submersion



FFS FIRE SERVICE TRAINING


Procedimientos de rescate

Slide 83

Grain Bin Emergencies Awareness

Rescue Procedures

- Prevent further pressure on victim by:
 - Staying away from area around victim
 - Use a ladder, plywood, or other materials to distribute weight
- Rescuer protection should be a concern
 - Provide safety lines
 - Consider respiratory protection



FFS FIRE SERVICE TRAINING

Procedimientos de rescate

Material para el estudiante

Slide 84

Grain Bin Emergencies Awareness

Rescue Procedures

- If grain can't be hand scooped:
 - Cut holes in the bin on two opposite sides
 - Holes should be semi-circular or V-shaped
 - 30-40 inches across within the bolt lines
 - Victims location dictates location of holes
 - Cut just below victim who is submerged
 - As low as possible if victim is not visible

Bin Opening Guidelines For Rescue
FIGURE 1

SEATTLE FIRE SERVICE TRAINING

Procedimientos de rescate

Slide 85

Grain Bin Emergencies Awareness

Remember:

Each grain-handling facility is unique in layout, design, construction, operations, equipment, and personnel.

Each facility warrants individual preplanning.

Be Prepared!

SEATTLE FIRE SERVICE TRAINING 35

Recuerde:

Slide 86

Grain Bin Emergencies Awareness

Stored Products Research and Educational Center – Grain Bin Rescue

SEATTLE FIRE SERVICE TRAINING

Video – Seguridad en Depósito de Grano
Se puede ver este video en www.youtube.com/watch?v=DQsqWbn-3X0


Slide 87

Grain Bin Emergencies Awareness

The Technical information presented in this program is in no way meant to qualify the participants as experts in the field of **GRAIN BIN EMERGENCIES**.

Participation in this program should be considered a learning and sharing experience. The instructors and assistants share with the students information they have gained through actual experience as well as training sessions they have attended. **THE IMPORTANCE OF REPEATED PRACTICE AND ADDITIONAL TRAINING CANNOT BE OVER STRESSED.**

The methods and procedures presented in this program are **NOT** to be considered absolute.



Participación en el programa


Slide 88

Grain Bin Emergencies Awareness

Summary

Avoid entering grain bins whenever possible!
If entry must be made:


- TURN OFF and lock out all grain moving equipment and dryers
- Use a body harness and anchored lifeline
- Test the bin's air (oxygen, flammability, toxic)
- DO NOT walk down grain
- DO NOT enter below bridged grain or wall build ups
- HAVE a trained/equipped observer outside




Resumen

Slide 89

Grain Bin Emergencies Awareness



Program paid for with assistance from the Occupational Safety and Health Administration Susan Harwood Training Grant.



Patrocinio del programa

Slide 90



Gerencia del programa y reconocimientos

**Safety Data Sheet (SDS)**

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

*** 1 Identification****· Product identifier**

· Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

· Relevant identified uses of the substance or mixture and uses advised against

· Product description Fumigant for Insect & Rodent Control

· Application of the substance / the mixture

Fumigants used to treat raw agricultural commodities, processed foods, non-food commodities and rodent burrows.

· Details of the supplier of the safety data sheet**· Manufacturer/Supplier:**

DEGESCH America, Inc.
153 Triangle Dr.
P.O. Box 116
Weyers Cave, VA 24486 USA
Telephone: (540) 234-9281 / 800-330-2525
Telefax: (540) 234-8225
www.degeschamerica.com
degesch@degeschamerica.com

· Emergency telephone number:

For human or animal emergencies: 1-800-308-4856 (Rocky Mountain Poison and Drug Center)

For all other chemical emergencies: 1-800-424-9300 (Chemtrec)

Emergency and Information - DEGESCH America, Inc.: (540) 234-9281 / 800-330-2525

*** 2 Hazard(s) identification****· Classification of the substance or mixture**

GHS02 Flame

Water-react. 1 H260 In contact with water releases flammable gases which may ignite spontaneously.



GHS06 Skull and crossbones

Acute Tox. 2 H300 Fatal if swallowed.

Acute Tox. 2 H330 Fatal if inhaled.



GHS05 Corrosion

Eye Dam. 1 H318 Causes serious eye damage.



GHS09 Environment

Aquatic Acute 1 H400 Very toxic to aquatic life.

(Contd. on page 2)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5



GHS07

Skin Irrit. 2 H315 Causes skin irritation.

· **Label elements**· **GHS label elements**

The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

GHS02 GHS05 GHS06 GHS09

· **Signal word** Danger· **Hazard-determining components of labeling:**

Aluminum Phosphide
Ammonium Carbamate
Proprietary

· **Hazard statements**

In contact with water releases flammable gases which may ignite spontaneously.
Fatal if swallowed or if inhaled.
Causes skin irritation.
Causes serious eye damage.
Very toxic to aquatic life.

· **Precautionary statements**

Keep away from any possible contact with water, because of violent reaction and possible flash fire.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wear respiratory protection.
Wear protective gloves / eye protection / face protection.
Avoid release to the environment.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
If swallowed: Immediately call a poison center/doctor.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Specific treatment is urgent (see supplementary first aid instructions on this Safety Data Sheet).
Take off contaminated clothing and wash before reuse.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
If skin irritation occurs: Get medical advice/attention.
In case of fire: Use for extinction: CO₂, sand, extinguishing powder.
If on skin: Wash with plenty of water.
Collect spillage.
Store locked up.
Store in a well-ventilated place. Keep container tightly closed.
Store in a dry place. Store in a closed container.
Dispose of contents/container in accordance with local/regional/national/international regulations.

(Contd. on page 3)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

- **Unknown acute toxicity:**
13.3 percent of the mixture consists of ingredient(s) of unknown toxicity.
- **Classification system:**
- **NFPA ratings (scale 0 - 4)**



Health = 4
Fire = 4
Reactivity = 2

The substance demonstrates unusual reactivity with water.

- **HMIS-ratings (scale 0 - 4)**



Health = *4
Fire = 4
Reactivity = 2

- **Other hazards** None known

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**
- **Description:** Mixture of substances listed below with nonhazardous additions.

Dangerous Components:

CAS: 20859-73-8 RTECS: BD 1400000	Aluminum Phosphide ⚠ Water-react. 1, H260; ⚠ Acute Tox. 2, H300; ⚠ Aquatic Acute 1, H400	55%
CAS: 1111-78-0 RTECS: BD 1200000	Ammonium Carbamate ⚠ Eye Dam. 1, H318; ⚠ Acute Tox. 4, H302; Skin Irrit. 2, H315; Aquatic Acute 3, H402	Proprietary%
	Proprietary ⚠ STOT SE 3, H335	2-12%
	Proprietary ⚠ STOT SE 3, H335	2-12%
	Proprietary ⚠ Carc. 2, H351; ⚠ Acute Tox. 4, H302; Skin Irrit. 2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320	2-12%

Additional information:

Phostoxin Tablets, Phostoxin Pellets, Phostoxin Tablet Prepac, Phostoxin Prepac Ropes, DetiaPhos Tablets and DetiaPhos Pellets react with water to produce phosphine (hydrogen phosphide, PH₃, CAS No. 7803-51-2) as shown in Equation 1. Phostoxin and DetiaPhos products are formulated with 55% aluminum phosphide and also contains ammonium carbamate (AC) and inert ingredients. Ammonium carbamate decomposes to liberate ammonia (CAS No. 7664-41-7) and carbon dioxide (CAS No. 124-38-9) as shown in Equation 2.

- 1) $AIP + 3H_2O \rightarrow Al(OH)_3 + PH_3$
- 2) $NH_2COONH_4 \rightarrow 2NH_3 + CO_2$

(Contd. on page 4)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

* 4 First-aid measures

- **Description of first aid measures**

- **General information:**

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In ALL cases of overexposure, get medical attention immediately. Take victim to a doctor or emergency treatment facility.

Have product container label and applicator's manual with you when calling a poison control center, doctor, or when going for treatment.

- **After inhalation:**

Get exposed person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth to mouth, if possible. Contact a poison control center or doctor for treatment advice.

- **After skin contact:**

Take off contaminated clothing immediately. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

- **After eye contact:**

Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice.

- **After swallowing:**

Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless told to by a poison control center or doctor.

- **Information for doctor:**

- **Most important symptoms and effects, both acute and delayed**

Aluminum phosphide fumigant products react with moisture from the air, acids and many other liquids to release phosphine gas (hydrogen phosphide, PH₃). Mild exposure by inhalation causes malaise (indefinite feeling of sickness), headache, ringing in the ears, fatigue, nausea and pressure in the chest which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty breathing). Symptoms of severe poisoning may occur within a few hours to several days resulting in pulmonary edema and may lead to dizziness, cyanosis, unconsciousness, and death.

- **Indication of any immediate medical attention and special treatment needed**

No further relevant information available.

* 5 Fire-fighting measures

- **Extinguishing media**

- **Suitable extinguishing agents:** CO₂, sand, extinguishing powder. Do not use water.

- **For safety reasons unsuitable extinguishing agents:** Water

- **Special hazards arising from the substance or mixture**

Phosphine (hydrogen phosphide, PH₃)-air mixtures at concentrations above the LEL of 1.8% v/v (18,000 ppm) may ignite spontaneously. Ignition of high concentrations of phosphine gas (hydrogen phosphide, PH₃) can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. Never allow the buildup of phosphine gas (hydrogen phosphide, PH₃) to exceed explosive concentrations. Open containers of metal phosphides in open air only and never in a flammable atmosphere. Do not confine spent or partially spent dust from metal phosphide fumigants as the slow release of phosphine gas (hydrogen phosphide, PH₃) from these materials may result in the formation of an explosive atmosphere. Spontaneous ignition may occur if large quantities of aluminum phosphide are piled in contact with liquid water. This is particularly true if quantities of these materials are placed in an environment which can provide

(Contd. on page 5)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

partial confinement of the hydrogen phosphide gas liberated by hydrolysis.

If incinerated, product will release the following toxic materials: Oxides of aluminum, phosphorous, nitrogen (NOx), carbon, phosphine gas (hydrogen phosphide, PH₃), ammonia and phosphoric acid.

• **Advice for firefighters**

Aluminum phosphide is not flammable by itself. However, it reacts readily with water to produce phosphine gas (hydrogen phosphide, PH₃) which may ignite spontaneously in air at concentrations above its LEL of 1.8% v/v (18,000 ppm). The UEL of phosphine gas (hydrogen phosphide, PH₃) is unknown.

• **Protective equipment:**

As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

Wear a NIOSH/MSHA approved full-face gas mask – phosphine gas canister combination may be used at levels up to 15 ppm or following manufacturers' use conditions instructions for escape. Above 15 ppm or in situations where the phosphine gas concentration is unknown, a NIOSH/MSHA approved SCBA must be worn.

* **6 Accidental release measures**

• **Personal precautions, protective equipment and emergency procedures**

Respiratory protection will most likely be required during cleanup of spilled aluminum phosphide fumigants. If the concentration of phosphine (hydrogen phosphide, PH₃) is unknown, NIOSH/MSHA approved SCBA or its equivalent must be worn. Full-face gas mask canister combinations may only be worn at concentrations no higher than 15 ppm.

• **Environmental precautions:**

Inform respective authorities in case of seepage into water course or sewage system.

• **Methods and material for containment and cleaning up:**

If possible, dispose of spilled material by use according to label instructions. Freshly spilled material which has not been contaminated by water or foreign matter may be placed back into its original or other air-tight container. Punctured flasks, pouches or containers may be temporarily repaired using aluminum tape. If the age of the spill is unknown or if the product has been contaminated with soil, debris, water, etc., gather up the spillage in small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 to 1.5 kg (2 to 3 lbs.) to a bucket. If on-site wet-deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area.

Small amounts of spillage, from about 4 to 8 kg (9 to 18 lbs.) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled aluminum phosphide fumigants may be deactivated by the wet method as described in the following:

Wet Deactivation of Spilled Phostoxin & DetiaPhos Products:

1. Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.
2. The material is added slowly to the deactivating solution and stirred so as to thoroughly wet all of the product. This should be carried out in open air and respiratory protection may be required. At no time should the deactivation drum be covered.
3. No more than about 45 to 50 lbs. of Phostoxin or DetiaPhos should be added to 15 gallons of water-detergent mixture. Prepacs and Ropes may ignite during wet deactivation if they are allowed to float to the surface. Add weights or otherwise ensure that Phostoxin or DetiaPhos products stay submerged until deactivation is completed.
4. Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry of dust or packaged product will then be safe for disposal.
5. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm

(Contd. on page 6)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

sewer or out onto the ground.

If possible, dispose of spilled material by use according to label instructions. Freshly spilled material which has not been contaminated by water or foreign matter may be placed back into its original or other air-tight container. Punctured flasks, pouches or containers may be temporarily repaired using aluminum tape. If the age of the spill is unknown or if the product has been contaminated with soil, debris, water, etc., gather up the spillage in small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 to 1.5 kg (2 to 3 lbs.) to a bucket. If on-site wet-deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area.

Small amounts of spillage, from about 4 to 8 kg (9 to 18 lbs.) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled aluminum phosphide fumigants may be deactivated by the wet method as described in the following:

Wet Deactivation of Spilled Phostoxin & DetiaPhos Products:

1. Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.
2. The material is added slowly to the deactivating solution and stirred so as to thoroughly wet all of the product. This should be carried out in open air and respiratory protection may be required. At no time should the deactivation drum be covered.
3. No more than about 45 to 50 lbs. of Phostoxin or DetiaPhos should be added to 15 gallons of water-detergent mixture. Prepac and Ropes may ignite during wet deactivation if they are allowed to float to the surface. Add weights or otherwise ensure that Phostoxin or DetiaPhos products stay submerged until deactivation is completed.
4. Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry of dust or packaged product will then be safe for disposal.
5. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out onto the ground.

• **Reference to other sections**

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

* 7 Handling and storage

• **Handling:**

• **Precautions for safe handling** Store in a cool, dry place in tightly closed containers.

• **Information about protection against explosions and fires:**

Protect from heat.

Keep ignition sources away - Do not smoke.

Protect against electrostatic charges.

Keep protective respiratory device available.

• **Conditions for safe storage, including any incompatibilities**

Store away from water, acids, bases, strong oxidizing agents and strong reducing agents.

• **Storage:**

• **Requirements to be met by storerooms and receptacles:**

Store products in a locked, dry, well-ventilated area away from heat. Post as a pesticide storage area. Do not store in buildings inhabited by humans or domestic animals.

• **Information about storage in one common storage facility:** Not required.

(Contd. on page 7)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

· **Further information about storage conditions:**

Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Protect from heat and direct sunlight.

· **Specific end use(s)** No further relevant information available.

* **8 Exposure controls/personal protection**

· **Additional information about design of technical systems:** No further data; see section 7.

· **Control parameters**

All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use local exhaust at filling zones and where leakage and dust formation is probable. Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure Limits in Air below TLV & PEL limits.

· **Components with occupational exposure limits:**

20859-73-8 Aluminum Phosphide	
REL	Long-term value: 2 mg/m ³ as Al
TLV	Long-term value: 1* mg/m ³ as Al; *as respirable fraction
Proprietary	
PEL	Long-term value: 15*; 15** mg/m ³ *Total dust; ** Respirable fraction
REL	Long-term value: 10* 5** mg/m ³ as Al*Total dust**Respirable/pyro powd./welding f.
TLV	Long-term value: 1* mg/m ³ as Al; *as respirable fraction
Proprietary	
REL	Long-term value: 2 mg/m ³ as Al
TLV	Long-term value: 1* mg/m ³ as Al; *as respirable fraction
Proprietary	
PEL	Long-term value: 20 mppcf ppm (containing <1% Quartz)
REL	Long-term value: 2* mg/m ³ *respirable dust
TLV	Long-term value: 2* mg/m ³ *as respirable fraction; E
7803-51-2 phosphine	
PEL	Long-term value: 0.4 mg/m ³ , 0.3 ppm
REL	Short-term value: 1 mg/m ³ , 1 ppm Long-term value: 0.4 mg/m ³ , 0.3 ppm

(Contd. on page 8)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

- **Change in condition**
 - **Melting point/Melting range:** AIP = >1000 °C (AIP = >1832 °F) (PH3 = -133.5 °C)
 - **Boiling point/Boiling range:** AIP = >1000 °C (AIP = >1832 °F) (PH3 = -87.7 °C)
- **Flash point:** Not determined
- **Flammability (solid, gaseous):** Contact with water or acids liberates extremely flammable gases.
- **Ignition temperature:** Not determined
- **Decomposition temperature:** Decomposes at ambient conditions when moisture is present.
- **Auto igniting:** Spontaneously flammable in air.
- **Danger of explosion:** Not determined.
- **Explosion limits:**
 - **Lower:** 1.8 Vol % (for PH3)
 - **Upper:** Not established Vol % (for PH3)
- **Vapor pressure:**
 - AIP = 0 mm Hg
 - PH3 = 40 mm Hg @ -129.4 °C
 - AC = 100 mm Hg @ 26.7 °C
- **Density @ 20 °C (68 °F):** AIP = 2.85 g/cm³ (AIP = 23.783 lbs/gal) (PH3 = 1.17 g/cm³)
- **Relative density:** Not determined.
- **Vapor density:** Not applicable.
- **Evaporation rate:** Not applicable.
- **Solubility in / Miscibility with Water:**
 - AIP = Insoluble, reacts
 - PH3 = 26 cc in 100 ml at 17 °C
 - AC = Very soluble, reacts
- **Partition coefficient (n-octanol/water):** Not determined.
- **Viscosity:**
 - **Dynamic:** Not applicable.
 - **Kinematic:** Not applicable.
- **Solvent content:**
 - **Organic solvents:** 0.0 %
 - **Solids content:** 100.0 %
- **Other information:** No further relevant information available.

*10 Stability and reactivity

- **Reactivity:** No further relevant information available.
- **Chemical stability:** Products are stable to most chemical reactions, except for hydrolysis. Products will react with moist air, liquid water, acids and some other liquids to produce toxic and flammable phosphine (hydrogen phosphide, PH3) gas.
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions:** Contact with water releases flammable gases.

(Contd. on page 10)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

Contact with water releases toxic gases.

· **Conditions to avoid:** Avoid prolonged exposure to air.

· **Incompatible materials:** Water, acids, bases, strong oxidizing agents and strong reducing agents.

· **Hazardous decomposition products:**

Oxides of aluminum, phosphorous, nitrogen (NO_x), carbon, phosphine gas (hydrogen phosphide, PH₃), ammonia and phosphoric acid.

· **Additional information:**

Phosphine (hydrogen phosphide, PH₃) gas may react with certain metals and cause corrosion, especially at higher temperatures and relative humidity. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment may be damaged by this gas. Phosphine (hydrogen phosphide, PH₃) will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

*11 Toxicological information

· **Information on toxicological effects**

· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

20859-73-8 Aluminum Phosphide		
Oral	LD50	0.4 mg/kg (rat)
1111-78-0 Ammonium Carbamate		
Oral	LD50	1470 mg/kg (rat)
Inhalative	LC50/96 hours	37 mg/l (Trout)
7803-51-2 phosphine		
Inhalative	LC50/1 h	180 ppm (rat)
7664-41-7 ammonia, anhydrous		
Oral	LD50	350 mg/kg (rat)
Inhalative	LC50/4 h	2000 mg/l (rat)

· **Primary irritant effect:**

· **on the skin:**

May be irritating.

Irritant to skin and mucous membranes.

· **on the eye:**

Direct contact may cause eye irritation.

Strong irritant with the danger of severe eye injury.

Causes serious eye irritation.

· **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:

Irritant

Very toxic

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

Group 1 - Carcinogenic to humans

Group 2A - Probably carcinogenic to humans

(Contd. on page 11)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

- Group 2B - Possibly carcinogenic to humans
- Group 3 - Not classifiable as to its carcinogenicity to humans
- Group 4 - Probably not carcinogenic to humans

Proprietary	2B
· NTP (National Toxicology Program)	
None of the ingredients are listed.	
· OSHA-Ca (Occupational Safety & Health Administration)	
None of the ingredients are listed.	

***12 Ecological information**

- **Toxicity** The hazards for the aquatic environment are unknown.
- **Aquatic toxicity:**
Avoid release into the environment. Runoff from fire control or dilution water may cause pollution.

1111-78-0 Ammonium Carbamate

EC50	129.1 mg/l (Green algae)
	63 mg/l (Water flea)

- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
- **Bioaccumulative potential** No further relevant information available.
- **Mobility in soil** No further relevant information available.
- **Ecotoxicological effects:**
- **Remark:** Very toxic for fish
- **Additional ecological information:**
- **General notes:**
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Very toxic for aquatic organisms
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

***13 Disposal considerations**

- **Waste treatment methods**
- **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
When being disposed of, spilled or partially reacted Phostoxin or DetiaPhos products are considered hazardous wastes under existing Federal Regulations. If properly exposed, the grayish-white residual dust after a fumigation will not be a hazardous waste and normally contains only a very small amount of unreacted aluminum phosphide. This waste will be safe for disposal. However, the spent residual dust from incompletely exposed Phostoxin or DetiaPhos products may require special care. Triple rinse tablet and pellet flasks and stoppers with water and then offer for recycling or reconditioning; or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a storm sewer, sanitary landfill or by other approved procedures. Or, it is permissible to remove lids and expose empty flasks to atmospheric conditions until the residue in the flasks is reacted. Then puncture and dispose of in a sanitary landfill or other approved site, or by other procedures approved by state and local

(Contd. on page 12)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

authorities. Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your State Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.



1. Confinement of partially spent residual materials, as in a closed container, or collection and storage of large quantities of dust may result in a fire or explosion hazard. Small amounts of phosphine (hydrogen phosphide, PH₃) may be given off from unreacted aluminum phosphide, and confinement of the gas may result in a flash.
2. In open areas, small amounts of spent residual dust or spent packaged products may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.
3. Residual dust from Phostoxin or DetiaPhos products may also be collected and disposed of at a sanitary landfill, or other approved sites or by other procedures approved by Federal, State or Local authorities.
4. From 3 to 5 kg (7 to 10 lbs.) of spent dust from 2 to 3 flasks of Phostoxin or DetiaPhos may be collected for disposal in a 1-gallon bucket. Larger amounts, up to about one-half case, may be collected in burlap, cotton or other types of porous cloth bags for transportation in an open vehicle to the disposal site. Do not collect dust from more than 7 flasks of tablets, 10 flasks of pellets (about 11 kg or 25 lbs.) in a single bag. Do not pile cloth bags together. Do not use this method for partially spent or "green" dust. Caution: Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

· **Uncleaned packagings:**

· **Recommendation:**

Triple rinse tablet and pellet flasks and stoppers with water and then offer for recycling or reconditioning; or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

* **14 Transport information**

· UN-Number	UN1397
· DOT, ADR, IMDG, IATA	UN1397
· UN proper shipping name	Aluminum phosphide
· DOT	UN1397 Aluminum phosphide, ENVIRONMENTALLY HAZARDOUS
· ADR	ALUMINIUM PHOSPHIDE, MARINE POLLUTANT
· IMDG	ALUMINIUM PHOSPHIDE
· IATA	
· Transport hazard class(es)	
· DOT	
	
	
· Class	4.3 Substances which, in contact with water, emit flammable gases
· Label	4.3, 6.1

(Contd. on page 13)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

· ADR**· Class**

4.3 (WT2) Substances which, in contact with water, emit flammable gases

· Label

4.3, 6.1

· IMDG**· Class**

4.3 Substances which, in contact with water, emit flammable gases

· Label

4.3/6.1

· IATA**· Class**

4.3 Substances which, in contact with water, emit flammable gases

· Label

4.3 (6.1)

· Packing group**· DOT, ADR, IMDG, IATA**

I

· Environmental hazards:Product contains environmentally hazardous substances:
Aluminum Phosphide**· Special marking (ADR):**

Symbol (fish and tree)

· Special precautions for user

Warning: Substances which, in contact with water, emit flammable gases

· Danger code (Kemler):

462

· EMS Number:

F-G,S-N

· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

· Transport/Additional information:**· DOT****· Quantity limitations**On passenger aircraft/rail: Forbidden
On cargo aircraft only: 15 kg**· ADR****· Excepted quantities (EQ)**

Code: E0

Not permitted as Excepted Quantity

(Contd. on page 14)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

- **IMDG**
- **Limited quantities (LQ)** 0
- **Excepted quantities (EQ)** Code: E0
- **UN "Model Regulation":** Not permitted as Excepted Quantity
UN1397, Aluminum phosphide, ENVIRONMENTALLY HAZARDOUS, 4.3, 6.1, I

***15 Regulatory information**

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
- **Sara**

· **Section 355 (extremely hazardous substances):**

20859-73-8 Aluminum Phosphide

· **Section 313 (Specific toxic chemical listings):**

20859-73-8 Aluminum Phosphide

Proprietary

Proprietary

· **TSCA (Toxic Substances Control Act):**

20859-73-8 Aluminum Phosphide

Proprietary

Proprietary

Proprietary

Proprietary

Proprietary

· **Proposition 65**· **Chemicals known to cause cancer:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for females:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for males:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**

None of the ingredients are listed.

· **Carcinogenic categories**· **EPA (Environmental Protection Agency)**

Proprietary

D, I, II

· **TLV (Threshold Limit Value established by ACGIH)**

Proprietary

A4

Proprietary

A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients are listed.

(Contd. on page 15)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

- **GHS label elements**

This product is labeled according to FIFRA.

The product is classified and labeled according to the Globally Harmonized System (GHS).

- **Hazard pictograms**



GHS02 GHS05 GHS06 GHS09

- **Signal word** Danger

- **Hazard-determining components of labeling:**

Aluminum Phosphide

Ammonium Carbamate

Proprietary

- **Hazard statements**

In contact with water releases flammable gases which may ignite spontaneously.

Fatal if swallowed or if inhaled.

Causes skin irritation.

Causes serious eye damage.

Very toxic to aquatic life.

- **Precautionary statements**

Keep away from any possible contact with water, because of violent reaction and possible flash fire.

Do not breathe dust/fume/gas/mist/vapors/spray.

Wear respiratory protection.

Wear protective gloves / eye protection / face protection.

Avoid release to the environment.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

If swallowed: Immediately call a poison center/doctor.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.

Continue rinsing.

Specific treatment is urgent (see supplementary first aid instructions on this Safety Data Sheet).

Take off contaminated clothing and wash before reuse.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

If skin irritation occurs: Get medical advice/attention.

In case of fire: Use for extinction: CO₂, sand, extinguishing powder.

If on skin: Wash with plenty of water.

Collect spillage.

Store locked up.

Store in a well-ventilated place. Keep container tightly closed.

Store in a dry place. Store in a closed container.

Dispose of contents/container in accordance with local/regional/national/international regulations.

- **National regulations:**

The product is subject to be labeled according with the prevailing version of the regulations on hazardous substances.

(Contd. on page 16)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Printing date 04/02/2015

Reviewed on 04/02/2015

Trade name: Phostoxin® Tablets - U.S. EPA Reg. No. 72959-4; Phostoxin® Pellets - U.S. EPA Reg. No. 72959-5; Phostoxin® Tablet Prepac - U.S. EPA Reg. No. 72959-9; Phostoxin® Prepac Ropes - U.S. EPA Reg. No. 72959-8; DetiaPhos® Tablets - U.S. EPA Reg. No. 72959-4; DetiaPhos® Pellets - U.S. EPA Reg. No. 72959-5

State Right to Know		
CAS: 20859-73-8 RTECS: BD 1400000	Aluminum Phosphide ⚠ Water-react. 1, H260; ⚠ Acute Tox. 2, H300; ⚠ Aquatic Acute 1, H400	55%
CAS: 1111-78-0 RTECS: BD 1200000	Ammonium Carbamate ⚠ Eye Dam. 1, H318; ⚠ Acute Tox. 4, H302; Skin Irrit. 2, H315; Aquatic Acute 3, H402	Proprietary%
	Proprietary ⚠ STOT SE 3, H335	2-12%
	Proprietary ⚠ STOT SE 3, H335	2-12%
	Proprietary ⚠ Carc. 2, H351; ⚠ Acute Tox. 4, H302; Skin Irrit. 2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320	2-12%
	Proprietary	2-12%
All ingredients are listed.		

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

The information and recommendations in this safety data sheet are, to the best of our knowledge, accurate as of the date of issue. Nothing herein shall be deemed to create warranty, expressed or implied and shall not establish a legally valid contractual relationship. It is the responsibility of the user to determine applicability of this information and the suitability of the material or product for any particular purpose.

· **Date of preparation / last revision** 04/02/2015 / -

· **Abbreviations and acronyms:**

ADR: The European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN: The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Water-react. 1: Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 1

Acute Tox. 2: Acute toxicity, Hazard Category 2
Acute Tox. 4: Acute toxicity, Hazard Category 4
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Dam. 1: Serious eye damage/eye irritation, Hazard Category 1
Eye Irrit. 2B: Serious eye damage/eye irritation, Hazard Category 2B
Carc. 2: Carcinogenicity, Hazard Category 2
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3
Aquatic Acute 1: Hazardous to the aquatic environment - AcuteHazard, Category 1
Aquatic Acute 3: Hazardous to the aquatic environment - AcuteHazard, Category 3

· *** Data compared to the previous version altered.**

SDS created by MSDS Authoring Services www.msdsauthoring.com (877) 204-9106

