

363.17

03av

c.2



1033

AVANCES
DE ONEMI
EN EL TEMA :
ACCIDENTES
QUIMICOS

Santiago de Chile, diciembre de 1995

"Por un Chile Más Seguro en el siglo XXI"

AVANCES DE ONEMI EN EL TEMA:

ACCIDENTES QUIMICOS

1. EL 29 DE JULIO DE 1994 ONEMI INICIA LA CONFORMACION DEL PRIMER CENTRO NACIONAL DE DOCUMENTACION Y BANCO DE DATOS INFORMATIZADO SOBRE SUSTANCIAS PELIGROSAS.
2. DECLARACION «POR UN CHILE MAS SEGURO EN EL SIGLO XXI», SUSCRITA EL 08 DE AGOSTO DE 1994, POR CARABINEROS DE CHILE; MINISTERIO DE SALUD; JUNTA NACIONAL DE CUERPOS DE BOMBEROS Y ONEMI COMO ENTIDAD CONVOCANTE, A LA QUE, EL 20 DE NOVIEMBRE DE 1995 SE SUMAN LA COMISION NACIONAL DEL MEDIO AMBIENTE, CONAMA Y SERVICIO DE SALUD METROPOLITANO DEL AMBIENTE, MEDIANTE LA CUAL SE CONSTITUYE UN EQUIPO DE COORDINACION PARA EL USO COMPARTIDO DE LA INFORMACION Y PARA LA ACTUALIZACION, SUSTENTACION Y PERFECCIONAMIENTO PERMANENTE DEL CENTRO DE DOCUMENTACION Y BANCO DE DATOS SOBRE SUSTANCIAS PELIGROSAS.
3. INTRODUCCION DE LA METODOLOGIA APELL DISEÑADA POR EL CENTRO DE ACTIVIDAD DEL PROGRAMA INDUSTRIA Y MEDIO AMBIENTE (CAP/IMA) DEL PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE (PNUMA), CONCEBIDA PARA AYUDAR A LAS COMUNIDADES A FORTALECER SU PREPARACION ANTE SITUACIONES DE EMERGENCIA TECNOLÓGICA, QUE INTEGRA LOS ESFUERZOS DE LA INDUSTRIA, DEL GOBIERNO Y DE LA COMUNIDAD ORGANIZADA A TRAVES DE SUS LIDERES.
ONEMI HA ESTADO TRABAJANDO DESDE 1994 EN LA ADAPTACION A LA REALIDAD CHILENA DE ESTE MODELO APELL Y YA EFECTUO TALLERES DE CAPACITACION, UNO EN VALPARAISO Y DOS EN SANTIAGO.

4. REFORZAMIENTO DE LOS RECURSOS INFORMATICOS DE ONEMI PARA EL CUMPLIMIENTO DE LOS PROPOSITOS ACORDADOS:

BASES DE DATOS:

Ciquime:

SOFTWARE BASICO DE CONSULTA DE SUSTANCIAS PELIGROSAS (D.O.S), TRADUCCION DEL CANUTEC DE CANADA E INCLUYE INFORMACION DE CERCA DE 2.000 PRODUCTOS QUIMICOS. PROPORCIONADO POR EL CENTRO DE INFORMACION QUIMICA PARA EMERGENCIAS DE LA REPUBLICA DE ARGENTINA. (PROPORCIONADO AL CUERPO DE BOMBEROS DE NUÑOA DURANTE EL SEGUNDO SEMESTRE DE 1994, PARA SU ADAPTACION AL USO EN ACCIONES DE RESPUESTA)

Cameo:

SOFTWARE DE CONSULTA DE SUSTANCIAS PELIGROSAS (D.O.S. VERSION WINDOWS NO DISPONIBLE) QUE INCLUYE INFORMACION SOBRE UNOS 4.000 PRODUCTOS QUIMICOS, ENTREGANDO DATOS GENERALES DEL PRODUCTO, RESPUESTA INICIAL, PROPIEDADES QUIMICAS, COMBATE CONTRA FUEGO, VESTUARIO DE SEGURIDAD, ETC. IDIOMA INGLES. PROPORCIONADO POR EPA/NOAA DE LOS ESTADOS UNIDOS DE NORTEAMERICA.

MODELOS DE DISPERSION:

Aloha:

SOFTWARE PARA MODELAMIENTO DE LA DISPERSION DE CONTAMINANTES GASEOSOS EN LA ATMOSFERA (WINDOWS), QUE REQUIERE INFORMACION BASICA DEL ELEMENTO QUIMICO, CONDICIONES METEOROLOGICAS Y CARACTERISTICAS DE LA FUENTE EMISORA. ENTREGA REPRESENTACION ESPACIAL DE LA PLUMA DE CONTAMINANTE, GRAFICOS DE CONCENTRACIONES EN UN PUNTO Y TASA DE LIBERACION DEL PRODUCTO, ENTRE OTROS. PERMITE ENLACE CON MARPLOT Y CAMEO PARA WINDOWS. IDIOMA INGLES. PROPORCIONADO POR EPA/NOAA DE LOS ESTADOS UNIDOS DE NORTEAMERICA.

Marplot:

SOFTWARE DE ENLACE GRAFICO PARA ALOHA (WINDOWS). PERMITE SOBREPONER LA REPRESENTACION DE LA PLUMA DE CONTAMINANTE SOBRE LA IMAGEN DIGITAL GEOREFERENCIADA DE LA ZONA INVOLUCRADA EN EL ACCIDENTE TECNOLOGICO. IDIOMA INGLES. PROPORCIONADO POR EPA/NOAA DE LOS ESTADOS UNIDOS DE NORTEAMERICA.

CIQUIME

CONSULTA DE PRODUCTOS

Nombre del Producto

CLORATOS INORGANICOS N.O.S.
CLORHIDRINA DE ETILENO

DATOS DEL PRODUCTOS

PRODUCTO: CLORO

Nro.Nac.Unidas: 1017

Paquete: M

Clase Nac.Unidas: 2

Ficha: 12

[ENTER] Ficha Técnica - [ESC] Salir Ventana
CLOROACETATO DE METILO

- [PgUp] Pág. Arriba - [PgDn] Pág. Abajo - [TAB] Ver Datos

F1 - Ayuda del Sistema F4 - Ordenar Productos F7 - Impresión Productos
F8 - Buscar Producto F9 - Datos del Producto F10 - Salir Sistema

CENTRO DE INFORMACION QUIMICA PARA EMERGENCIAS

FICHA DEL PRODUCTO SELECCIONADO

=====
GUIA N. 12 GASES: VENENOSOS CORROSIVOS,OXIDANTES
Comprimidos, Licuados o Muy Refrigerados (Criogenicos)
=====

***** LLAME AL CIQUIME (01) 613-1100 *****

PELIGROS POTENCIALES

FUEGO O No arden pero pueden mantener la combustión.
EXPLOSION Las mezclas con combustibles pueden explotar.
Los vapores de gas licuado son inicialmente mas
pesados que el aire.

Algunos reaccionan violentamente con el agua o
el aire.

Algunos pueden reaccionar vigorosamente o de manera
explosiva con muchos materiales.

Los contenedores pueden explotar cuando se calientan

[PgUp] [PgDn] - [ESC] para Salir

F8 - Buscar Producto F9 - Datos del Producto F10 - Salir Sistema

(1406)

SISTEMA DE PRODUCTOS QUIMICOS

Ver. 1.0

FICHA DEL PRODUCTO SELECCIONADO

Los cilindros rotos pueden proyectarse

SALUD Muchos son mas pesados que el aire y se extienden sobre el suelo.
 Los VENENOSOS pueden ser fatales si se inhalan.
 El contacto con el gas o gas licuado puede causar daños serios o muerte.
 Los escurrimientos pueden contaminar vias fluviales

ACCIONES DE EMERGENCIA

GENERALES Aislar el area del peligro.
 Mantenerse con viento a favor.
 Mantener a las personas innecesarias alejadas.
 Mantenerse alejado de las areas bajas.

Mo ROPA DE Utilizar equipo de respiración autónoma y ropa
 PROTECCION de protección ESPECIAL.

tos

[PgUp] [PgDn] - [ESC] para Salir tos

F8 - Buscar Producto F9 - Datos del Producto Fl0 - Salir Sistema

CENTRO DE INFORMACION QUIMICA PARA EMERGENCIAS

20/11/95

(1406)

SISTEMA DE PRODUCTOS QUIMICOS

Ver. 1.0

FICHA DEL PRODUCTO SELECCIONADO

EVACUACION Considerar la evacuación a favor del viento.
 En caso de que un vagón o tanque este involucrado en un derrame o fuego, considerar una evacuacion inicial de 1500m a la redonda.

FUEGO Utilizar SOLO agua, NO USAR quimicos secos ni CO2 alrededores.
 Alejar los contenedores del area de fuego en caso de poder hacerlo sin riesgo.
 Enfriar los contenedores con volúmenes abundantes de agua, durante un buen tiempo, despues de que el fuego haya sido extinguido.
 Extinguir fuegos secundarios.
 Manejar los cilindros dañados con cuidado.

FUEGO EN TANQUES:

Mo Apagar el fuego desde la maxima distancia o utilizar soportes autónomos para mangueras o

tos

[PgUp] [PgDn] - [ESC] para Salir tos

F8 - Buscar Producto F9 - Datos del Producto Fl0 - Salir Sistema

FICHA DEL PRODUCTO SELECCIONADO

pitones reguladores.

No se dirija el agua a la fuente de la fuga o las válvulas de seguridad ya que puede haber congelamiento.

Retirarse de inmediato en caso de aumentar el ruido de las válvulas de seguridad o se empieza a decolorar el tanque.

Mantenerse SIEMPRE alejado de los extremos del tanque.

FUGA O
DERRAME

ELIMINAR todas las fuentes de ignición.

No tocar el material derramado

Detener la fuga en caso de poder hacerlo sin riesgo
Rociar con agua para reducir los vapores o desviar la nube de vapor.

De ser posible girar el contenedor de manera que escape el gas en lugar del liquido.

Represar para evitar el ingreso a alcantarillas,
[PgUp] [PgDn] - [ESC] para Salir tos

F8 - Buscar Producto F9 - Datos del Producto F10 - Salir Sistema

CENTRO DE INFORMACION QUIMICA PARA EMERGENCIAS

FICHA DEL PRODUCTO SELECCIONADO

sótanos o áreas confinadas.

Permitir que se evapore.

No dirigir el agua hacia el derrame o fuente de fuga.

PRIMEROS
AUXILIOS

Sacar al aire fresco. Aplicar respiración artificial si la víctima no esta respirando.

Administrar oxigeno si respira con dificultad.

Quitar ropa y calzado contaminado.

Mantener la víctima abrigada y en reposo.

Conseguir ayuda medica de inmediato.

Los efectos por contacto o inhalacion pueden ser retardados.

Asegurarse que el personal medico tenga conocimiento de la identidad del producto en cuestión.

Mo

[PgUp] [PgDn] - [ESC] para Salir tos

F8 - Buscar Producto F9 - Datos del Producto F10 - Salir Sistema

CAMEO

CHEMICAL: CHLORINE

CAS #: 7782-50-5

NOAA #: 2862

UN #: 1017

STCC: 4904120

RTECS: FD2100000

FORMULA: Cl2

LABEL: POISON GAS

NFPA CODES: H3 F0 R0 S Oxidizer

CERCLA (Y/N): Y
RQ: 10EHS (Y/N): Y
TPQ: 100

313 (Y/N): Y RCRA:

LAST UPDATE:10/20/92

STATE at ambient temperature: [Gas, Liquid, Solid] (G/L/S): G

LEVEL OF CONCERN: 0.00730000 gm/m3

LIQUID AMBIENT FACTOR:

LIQUID BOILING FACTOR:

LIQUID MOLTEN FACTOR:

CAMEO Response Information
[NOAA, 7600 Sand Point Way NE, Seattle, WA 98115 (206) 526-6317]

GENERAL DESCRIPTION:

Chlorine is a greenish yellow gas with a pungent suffocating odor. It is used to purify water, bleach woodpulp, and to make other chemicals. It is toxic by inhalation. It is slightly soluble in water. It reacts explosively or forms explosive compounds, with many common chemicals. It is normally shipped as a liquid in cylinders or tank cars. Contact with liquid should be avoided as it can cause frostbite. The liquid readily vaporizes to a gas. Chlorine does not burn but will support combustion (lets other articles burn). Long term exposure to low concentrations or short term exposure to high concentrations may result in adverse health effects from inhalation. The vapors are much heavier than air and tend to settle in low areas. Contact CHEMTREC to activate Chlorine Response Team (800 424-9300 or 202 483-7616). It weighs 13.0 pounds per gallon. ((c) AAR, 1991)

FIRE & EXPLOSIVE HAZARD:

May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may cause explosion. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Hydrogen and chlorine mixtures (5-95%) are exploded by almost any form of energy (heat, sunlight, sparks, etc.). May combine with water or steam to produce toxic and corrosive fumes of hydrochloric acid. Emits highly toxic fumes when heated. Avoid plastics and rubber. Avoid heat and contact with hydrogen gas or powdered metals.

(EPA, 1990)

FIRE FIGHTING:

Evacuate area endangered by gas. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. If it is necessary to stop the flow of gas, use water spray to direct escaping gas away from those effecting shut-off.

Will not burn, but most combustible materials will burn in chlorine as they do in oxygen; flammable gases will form explosive mixtures with chlorine. Dry chemical, carbon dioxide, water spray, fog or foam.

(EPA, 1990) ambient temperature: [Gas, Liquid, Solid] (G/L/S): G

PROTECTIVE CLOTHING AND SUIT MATERIAL COMPATIBILITY (ACGIN 1985:)

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. (EPA, 1990)

MATERIAL RATINGS

BARRICADE

FABRIC GT 3 hours

BLUE MAX

FABRIC GT 3 hours

BUTYL

FABRIC GT 3 hours

GLOVES GT 3 hours

BUTYL/NEOP

FABRIC GT 3 hours

CHECKMATE

FABRIC GT 3 hours

CHEMREL

FABRIC GT 3 hours

CHEMREL MAX

FABRIC GT 3 hours

CPF III

FABRIC GT 3 hours

FEP TEFLON
FACESHIELD GT 3 hours

INTERCEPTOR
FABRIC GT 3 hours

NEOP
FABRIC GT 3 hours
GLOVES GT 3 hours
BOOTS GT 3 hours

NEOP/BUTYL
GLOVES GT 3 hours

NIT+POLYURETHANE+PVC
BOOTS GT 3 hours

NITRILE
GLOVES GT 3 hours

PE
FABRIC LT 1 hour

PE/EVAL/PE
GLOVES GT 3 hours

POLYURETHANE+PVC
BOOTS GT 3 hours

PTFE TEFLON
FABRIC 1-3 hours

PVC
FABRIC LT 1 hour

RESPONDER
FABRIC GT 3 hours

SARANEX23P
FABRIC GT 3 hours

VITON
FABRIC GT 3 hours

VITON/NEOP
FABRIC GT 3 hours

NONFIRE RESPONSE:

Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Do not apply water to point of leak in tank car or container. Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow

=====
sing soil, sand bags, foamed polyurethane, or foamed concrete.
Absorb bulk liquid with fly ash or cement powder. Neutralize with
dilute caustic soda (NaOH) or soda ash (Na₂CO₃). Water spill: Add
dilute caustic soda (NaOH). If dissolved, in region of 10 ppm or
greater concentration, apply activated carbon at ten times the spilled
amount. Use mechanical dredges or lifts to remove immobilized masses
of pollutants and precipitates. ((c) AAR, 1991)s

VITON

FABRIC GT 3 hours

VITON/NEOP

FABRIC GT 3 hours

HEALTH HAZARDS:

Poisonous; may be fatal if inhaled. Contact may cause burns to skin
and eyes. Bronchitis or chronic lung conditions. (EPA, 1990)ot

FIRST AID:

Warning: Effects may be delayed. Caution is advised. Chlorine is
corrosive and may be converted to hydrochloric acid in the lungs.
Signs and Symptoms of Acute Chlorine Exposure: Signs and symptoms of
acute exposure to chlorine may include tachycardia (rapid heart rate),
hypertension (high blood pressure) followed by hypotension (low blood
pressure), and cardiovascular collapse. Pulmonary edema and pneumonia
are often seen. The eyes, nose, throat, and chest may sting or burn
following exposure to chlorine. Cough with bloody sputum, a feeling
of suffocation, dizziness, agitation, anxiety, nausea, and vomiting
are common. Dermal exposure may result in sweating, pain, irritation,
and blisters.

Emergency Life-Support Procedures: Acute exposure to chlorine may
require decontamination and life support for the victims. Emergency
personnel should wear protective clothing appropriate to the type and
degree of contamination. Air-purifying or supplied-air respiratory
equipment should also be worn, as necessary. Rescue vehicles should
carry supplies such as chlorine-resistant plastic sheeting and
disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid
self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and
note any trauma. If no pulse is detected, provide CPR. If not
breathing, provide artificial respiration. If breathing is labored,
administer oxygen or other respiratory support.
3. Obtain authorization and/or further instructions from the local
hospital for administration of an antidote or performance of other
invasive procedures.
4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid
self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and
note any trauma. If no pulse is detected, provide CPR. If not
breathing, provide artificial respiration. If breathing is labored,
administer oxygen or other respiratory support.

- =====
3. Remove contaminated clothing as soon as possible.
 4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.
 5. Wash exposed skin areas for at least 15 minutes with soap and water.
 6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
 7. Transport to a health care facility.
- Ingestion Exposure: No information is available. (EPA, 1990) ~~be~~ victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as chlorine-resistant plastic sheeting and disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chlorine.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Remove contaminated clothing as soon as possible.
4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.
5. Wash exposed skin areas for at least 15 minutes with soap and water.
6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
7. Transport to a health care facility.

=====

Ingestion Exposure: No information is available. (EPA, 1990) N₂ May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may cause explosion. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Hydrogen and chlorine mixtures (5-95%) are exploded by almost any form of energy (heat, sunlight, sparks, etc.). May combine with water or steam to produce toxic and corrosive fumes of hydrochloric acid. Emits highly toxic fumes when heated. Avoid plastics and rubber. Avoid heat and contact with hydrogen gas or powdered metals. (EPA, 1990)

CHEMICAL PROPERTIES:

Flash Point: Not Applicable. Not flammable. (USCG, 1991)
Lower Exp Limit: Not Applicable. Not flammable. (USCG, 1991)
Upper Exp Limit: Not Applicable. Not flammable. (USCG, 1991)
Auto Ign Temp: Not Applicable. Not flammable. (USCG, 1991)
Melting Point: -150 F (EPA, 1990)
Vapor Pressure: 7600 mm at 86 F (EPA, 1990)
Vapor Density (air = 1): 2.4 (USCG, 1991)
Specific Gravity, Liquid: 1.424 at 59 F (USCG, 1991)
Boiling Point: -30.3 F at 760 mm (EPA, 1990)
Molecular Weight: 70.91 (EPA, 1990)
IDLH: 30 ppm (NIOSH, 1990)
TLV TWA: 0.5 ppm ((c)ACGIH, 1991)
TLV STEL: 1 ppm ((c)ACGIH, 1991)Ts

ALOHA



SITE DATA INFORMATION:

Location: VALPARAISO, CHILE
Building Air Exchanges Per Hour: 0.56 (Sheltered double storied)
Time: November 20, 1995 0725 hours DST (User specified)

CHEMICAL INFORMATION:

Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 10 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 10 knots from NNW at 3 meters
No Inversion Height
Stability Class: D Air Temperature: 15° C
Relative Humidity: 50% Ground Roughness: Urban or forest
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Leak from short pipe or valve in vertical cylindrical tank
Tank Diameter: 2.44 meters
Tank Length: 4.22 meters
Tank Volume: 19.7 cubic meters
Tank contains liquid
Internal Temperature: 15° C
Chemical Mass in Tank: 25,601 kilograms
Tank is 91% full
Circular Opening Diameter: 2.5 inches
Opening is 21.1 centimeters from tank bottom
Release Duration: 17 minutes
Max Computed Release Rate: 1,660 kilograms/min
Max Average Sustained Release Rate: 1,640 kilograms/min
(averaged over a minute or more)
Total Amount Released: 24,577 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

Footprint Window

ALOHA 5.2



Time: November 16, 1995 1643 hours HST (Using computer's clock)

Chemical Name: CHLORINE

Wind: 10 knots from nw at 3 meters

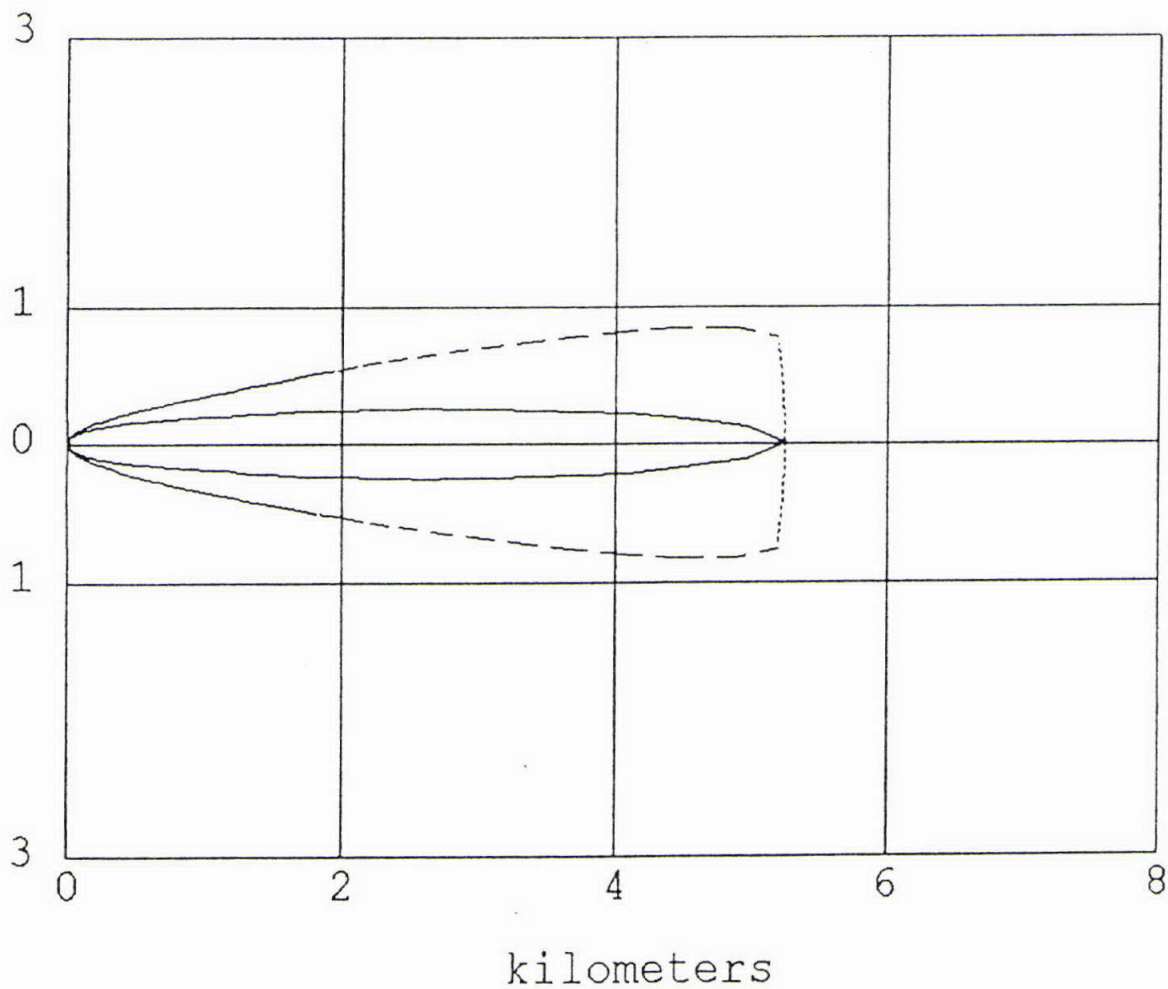
FOOTPRINT INFORMATION:

Model Run: Heavy Gas

User-specified LOC: equals IDLH (10 ppm)

Max Threat Zone for LOC: 5.3 kilometers

kilometers



Concentration Window

ALUHA 5.2



Time: November 16, 1995 1643 hours HST (Using computer's clock)

Chemical Name: CHLORINE

Building Air Exchanges Per Hour: 0.56 (Sheltered double storied)

TIME DEPENDENT INFORMATION:

Model Run: Heavy Gas

Concentration Estimates at the point:

Downwind: 2.5 kilometers

Off Centerline: 0 kilometers

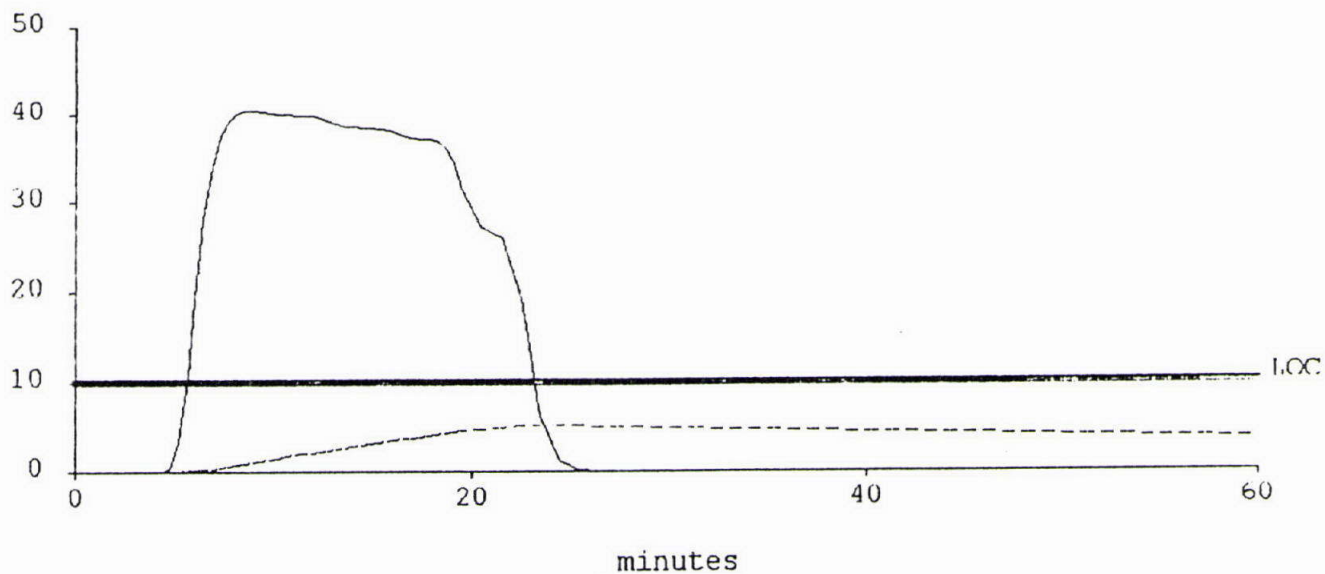
Max Concentration:

Outdoor: 40.3 ppm

Indoor: 5.18 ppm

Note: Indoor graph is shown with a dotted line.

ppm



Source Strength (Release Rate)

ALPHA 3.2



Time: November 16, 1995 1643 hours HST (Using computer's clock)

Chemical Name: CHLORINE

SOURCE STRENGTH INFORMATION:

Leak from short pipe or valve in vertical cylindrical tank

Tank Diameter: 2.44 meters

Tank Length: 4.22 meters

Tank Volume: 19.7 cubic meters

Tank contains liquid

Internal Temperature: 15° C

Chemical Mass in Tank: 25,601 kilograms

Tank is 91% full

Circular Opening Diameter: 2.5 inches

Opening is 21.1 centimeters from tank bottom

Release Duration: 17 minutes

Max Computed Release Rate: 1,660 kilograms/min

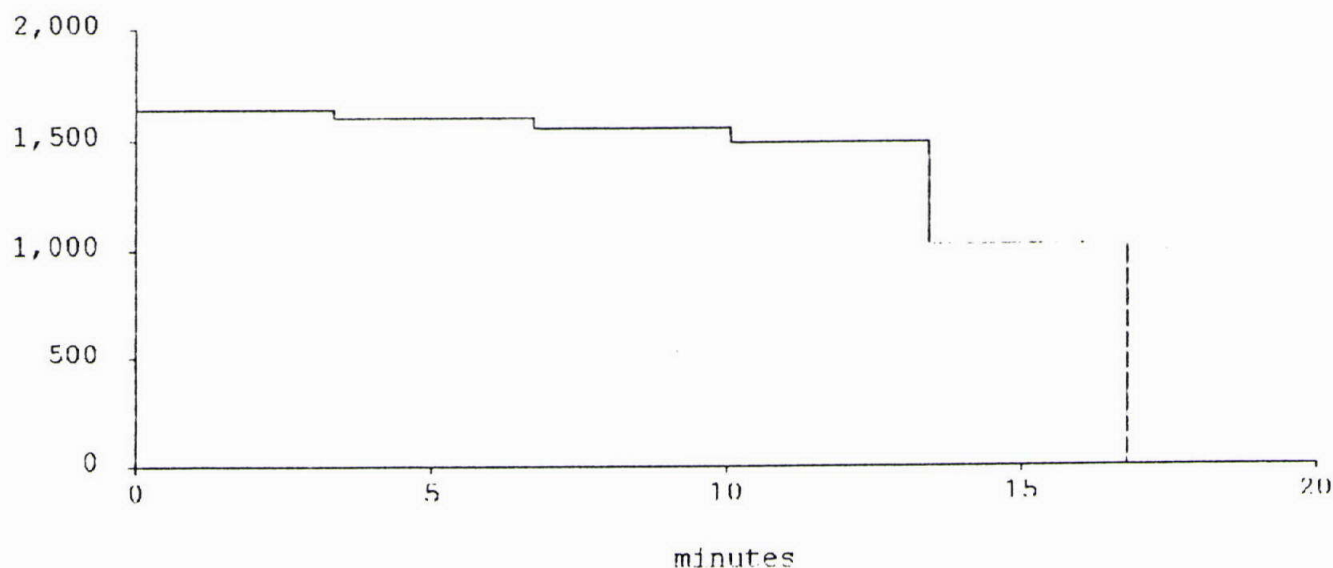
Max Average Sustained Release Rate: 1,640 kilograms/min

(averaged over a minute or more)

Total Amount Released: 24,577 kilograms

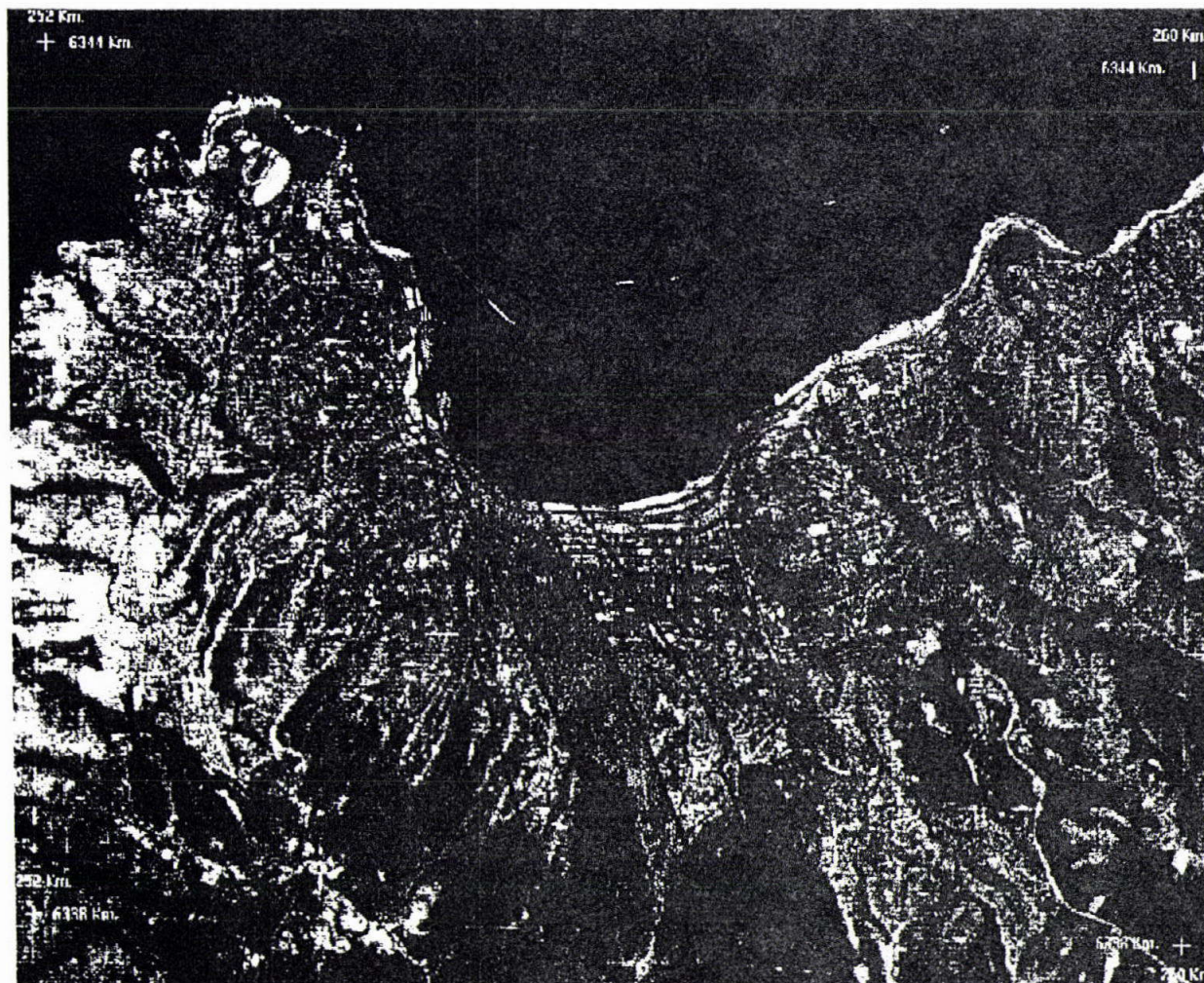
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

kilograms/minute



MARPLOT

SIMULACION DEL AREA DE INCIDENCIA DE UN ACCIDENTE CON SUSTANCIAS PELIGROSAS PUERTO DE VALPARAISO, V REGION, CHILE



Escala : 1:50.000 aprox.

IMAGEN : CIREN CORFO
SIMULACION: SOFTWARE ALOHA 5.2 EPA/USA
PROCESO: OFICINA NACIONAL DE EMERGENCIA MINISTERIO DEL INTERIOR
UNIDAD DE TELECOMUNICACIONES E INFORMATICA/DEPTO. PROTECCION CIVIL



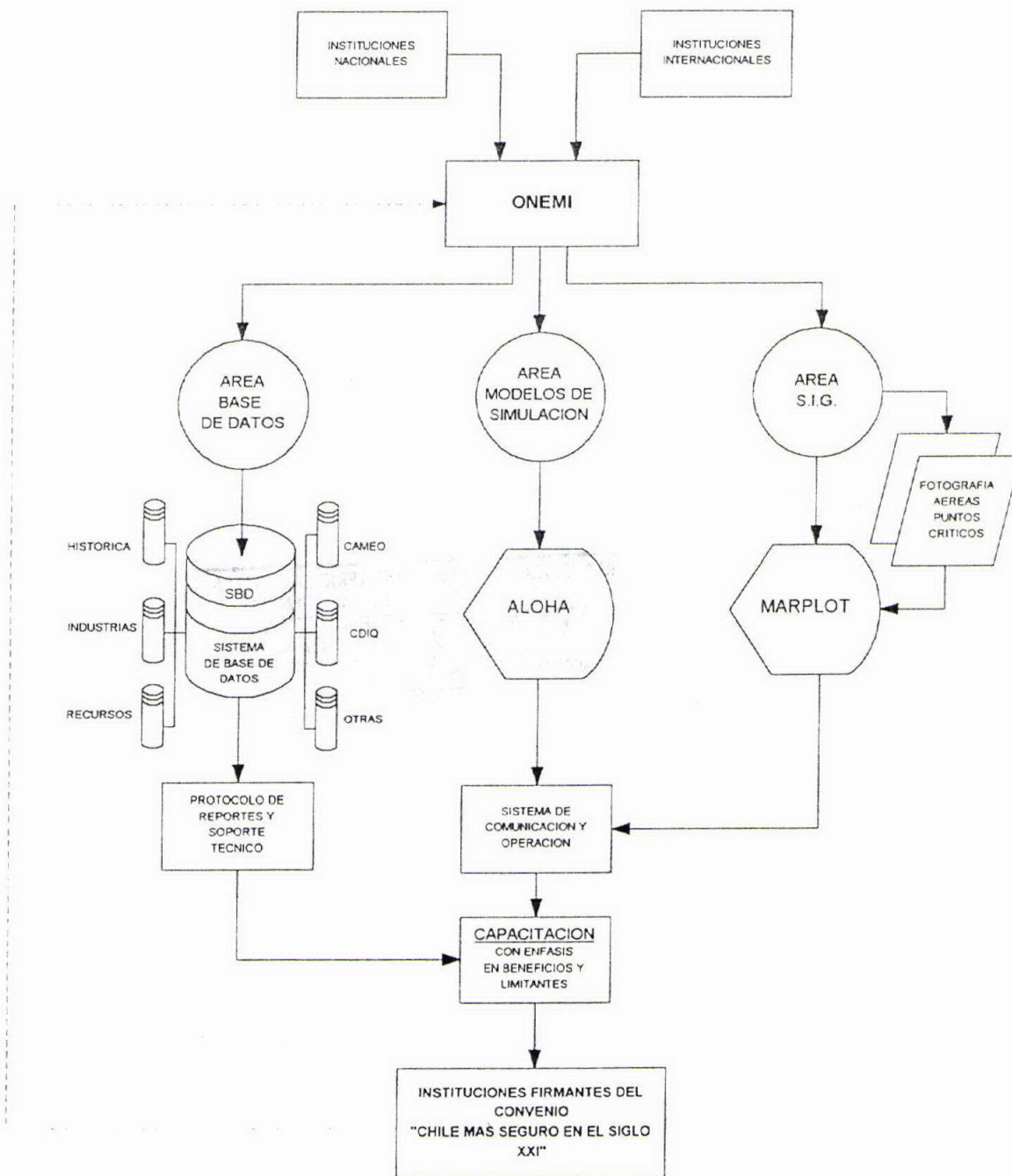
ZONA DE IMPACTO CRITICO A LA SALUD
PRODUCTO: CLORO CONTENEDOR: 28.6 MT3



LIMITE DE VARIACION DE LA DIRECCION
DE LA PLUMA

MODELO DE IMPLEMENTACION

MODELO DE IMPLEMENTACION SISTEMAS INFORMATICOS PARA EL MANEJO DE SUSTANCIAS PELIGROSAS





DATE DUE

[illegible]

GAYLORD	No. 2333
---------	----------

363.17
O3av
c.2

1033

Oficina Nacional de
Avances de ONEMI.....

INV. 453

DATE	ISSUED TO

363.17
O3av
c.2

Oficina Nacional de
Avances de ONEMI.....

1033

GAYLORD S

