





DEPARTMENT OF THE NAVY

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28 May 14

Mr. Keith K.A. Chang
Land Asset Manager, Kamehameha Schools
P.O. Box 3466
Honolulu, HI 96801

FU-LAD

Dear Mr. Chang:

We have reviewed your letter dated November 26, 2013 regarding the proposed solar farm development and its proximity to our Waiawa Pumping Station's Zone of Contribution (ZOC). Based on the content of your letter, all our concerns have been adequately addressed and we agree that your proposed solar farm development is a compatible land use within the designated ZOC.

Please continue to keep us informed as the planning and development of this project progresses. Our point of contact for this issue is Captain Mike Saum, Public Works Officer at (808) 448-2714.

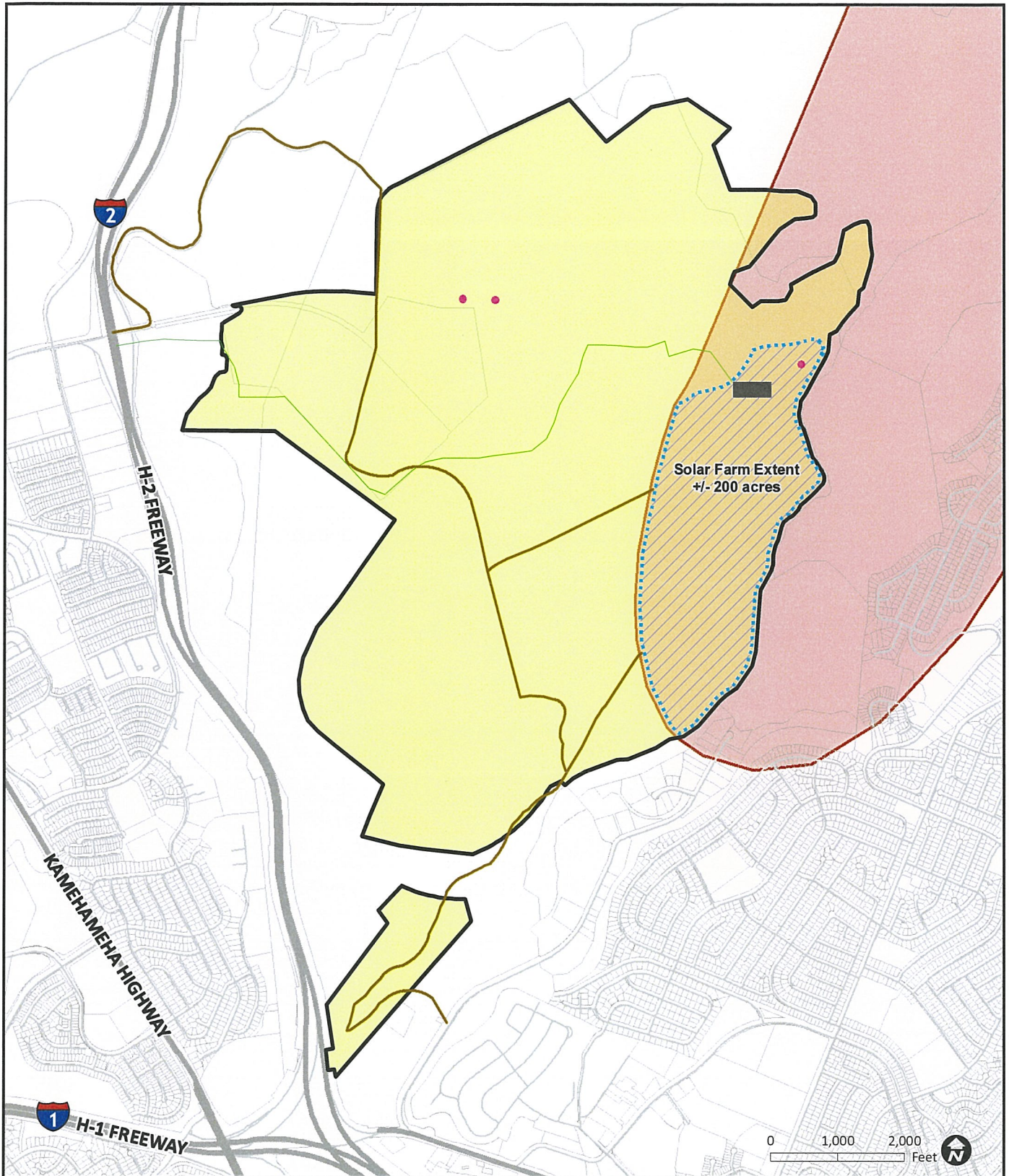
Sincerely,

J. W. JAMES
Captain, U.S. Navy
Commander

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Any misuse or unauthorized disclosure of this information may result in both criminal and civil penalties.

KS Exhibit 25

Exhibit C
Site Plan of the proposed Project



WAIAWA SOLAR POWER, LLC CONCEPTUAL SITE PLAN

July 19, 2019

Legend

Solar Farm Extent, ~200 acres

Utility Improvements Area (~ 2.5 acres)

KS Waiawa Property (SLUD- Urban, Docket A87-610)

Hydrologic Zone of Contribution (ZoC)

Archaeological Preservation Area

Gen-Tie Alignment

Access Route

Disclaimer: This Graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

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Exhibit D
Technical Information – Fire Suppression Agent in Battery Containers



How 3M™ Novec™ 1230 Fire Protection Fluid is stored as a liquid and discharged as a gas.

3M™ Novec™ 1230 Fire Protection Fluid has been developed for use as a gaseous, total-flooding extinguishing agent. To understand the ability of Novec1230 fluid to transform from a liquid into a gas upon discharge, some important physical properties need to be understood. For illustration, let's compare Novec 1230 fluid to the best known liquid: water.

**Intermolecular Forces
(or Attraction
between
Molecules)**

Water

Each molecule within the liquid water is strongly attracted to its nearest neighboring molecules, forming what's called a hydrogen bond. These strong attractive forces have a profound effect on the physical properties of water.

Novec 1230 Fluid

Novec 1230 fluid does not contain any hydrogen atoms, and therefore has no hydrogen bonds. The bonds between the molecules in Novec 1230 fluid are much weaker than the hydrogen bonds formed between water molecules. This weak attraction between molecules gives Novec 1230 fluid its unique physical properties.

Heat of Vaporization

Water

Because of its strong hydrogen bonds, water has a relatively high heat of vaporization. This means that a significant amount of energy (heat) is required to separate the molecules and convert it from a liquid to a gaseous state (steam or water vapor). When discharged through a nozzle, water tends to stay as liquid droplets since sufficient energy to convert it to vapor cannot be transferred into it in such a short period of time.

Novec 1230 Fluid

Novec 1230 fluid, on the other hand, has a low heat of vaporization. Because of its much weaker attraction between molecules, significantly less energy is needed to evaporate the fluid (25 times less than for water). The energy needed to convert the agent into a gaseous state is readily absorbed from the air when the fluid is discharged from the nozzle. In fact, if you pour Novec 1230 fluid onto a surface, it will evaporate in a matter of seconds.

Vapor Pressure

Water

Vapor pressure is also a measure of ease of evaporation. Water has a low vapor pressure, meaning that the air has a limited capacity to hold water in its vapor form. At 25°C, water vapor will saturate the air at about 3 percent by volume before it begins to recondense into liquid form.

Novec 1230 Fluid

Novec 1230 fluid has a vapor pressure that is about 12 times that of water, indicating the ease with which it can transform from a liquid to a gas. At 25°C, the air can hold 40% by volume of the agent without it recondensing to liquid form.

Liquid to Gas Upon Discharge

These physical properties allow 3M™ Novec™ 1230 Fire Protection Fluid to transition from a liquid to a gaseous state, even at cold discharge. In a properly designed extinguishing system, Novec 1230 fluid will be discharged through a nozzle that evenly distributes the agent throughout the enclosure. The low heat of vaporization and relatively high vapor pressure will allow rapid transformation from a liquid into a gas, extinguishing the fire, protecting valuable equipment, and leaving no residue.

Comparison of Key Physical Properties of Water and 3M™ Novec™ 1230 Fire Protection Fluid

Property	Unit	Water	Novec 1230 fluid
Boiling Point	°C	100	49
Freezing Point	°C	0	-108
Vapor Pressure @ 25°C	kPa	3.2	40.4
Heat of Vaporization @ 25°C	kJ/kg	2442	95

United States

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3M Center, Building 223-6S-04
St. Paul, MN 55144-1000
800 810 8513
800 810 8514 (Fax)

Europe

3M Specialty Materials
3M Belgium N. V.
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Canada

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813 3709 8250

Asia Pacific and Latin America

Call (U.S.) 651 736 7123

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3M Specialty Materials

3M Center, Building 223-6S-04
St. Paul, MN 55144-1000
www.3m.com/novec1230fluid

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Safety Data Sheet

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SECTION 1: Identification

1.1. Product identifier

3M™ Novec™ 1230 Fire Protection Fluid

Product Identification Numbers

98-0212-3203-2, 98-0212-3217-2, 98-0212-3414-5

1.2. Recommended use and restrictions on use

Recommended use

Streaming and Flooding Fire Protection

1.3. Supplier's details

MANUFACTURER:	3M
DIVISION:	Electronics Materials Solutions Division
ADDRESS:	3M Center, St. Paul, MN 55144-1000, USA
Telephone:	1-888-3M HELPS (1-888-364-3577)

1.4. Emergency telephone number

1-800-364-3577 or (651) 737-6501 (24 hours)

SECTION 2: Hazard identification

2.1. Hazard classification

Not classified as hazardous according to OSHA Hazard Communication Standard, 29 CFR 1910.1200.

2.2. Label elements

Signal word

Not applicable.

Symbols

Not applicable.

Pictograms

Not applicable.

SECTION 3: Composition/information on ingredients

3M™ Novec™ 1230 Fire Protection Fluid	07/25/18
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Ingredient	C.A.S. No.	% by Wt
1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	> 99.5

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:

Remove person to fresh air. If you are concerned, get medical advice.

Skin Contact:

Wash with soap and water. If signs/symptoms develop, get medical attention.

Eye Contact:

Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.

If Swallowed:

No need for first aid is anticipated.

4.2. Most important symptoms and effects, both acute and delayed

See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required

Not applicable

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Material will not burn. Use a fire fighting agent suitable for the surrounding fire.

5.2. Special hazards arising from the substance or mixture

Exposure to extreme heat can give rise to thermal decomposition.

Hazardous Decomposition or By-Products

Substance	Condition
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion
Toxic Vapor/Gas	During Combustion

5.3. Special protective actions for fire-fighters

When fire fighting conditions are severe and total thermal decomposition of the product is possible, wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

6.2. Environmental precautions:

Avoid release to the environment. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water.

6.3. Methods and material for containment and cleaning up

Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible in accordance with applicable local/regional/national/international regulations.

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Contents may be under pressure, open carefully. Do not breathe thermal decomposition products. For industrial or professional use only. Do not use in a confined area with minimal air exchange. Avoid release to the environment.

7.2. Conditions for safe storage including any incompatibilities

Protect from sunlight. Store in a well-ventilated place. Store at temperatures not exceeding 38C/100F. Store away from strong bases. Store away from other materials. Store away from amines.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters****Occupational exposure limits**

If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

Ingredient	C.A.S. No.	Agency	Limit type	Additional Comments
1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	Manufacturer determined	TWA:150 ppm(1940 mg/m3)	

ACGIH: American Conference of Governmental Industrial Hygienists

AIHA: American Industrial Hygiene Association

CMRG: Chemical Manufacturer's Recommended Guidelines

OSHA: United States Department of Labor - Occupational Safety and Health Administration

TWA: Time-Weighted-Average

STEL: Short Term Exposure Limit

CEIL: Ceiling

8.2. Exposure controls**8.2.1. Engineering controls**

Provide appropriate local exhaust when product is heated. For those situations where the material might be exposed to extreme overheating due to misuse or equipment failure, use with appropriate local exhaust ventilation sufficient to maintain levels of thermal decomposition products below their exposure guidelines. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)**Eye/face protection**

Eye protection not required.

Skin/hand protection

No chemical protective gloves are required.

Respiratory protection

If thermal degradation products are expected, use a full facepiece supplied-air respirator.

If thermal decomposition occurs:

Use a positive pressure supplied-air respirator if there is a potential for over exposure from an uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General Physical Form:	Liquid
Specific Physical Form:	Liquid
Odor, Color, Grade:	Clear colorless liquid with low odor
Odor threshold	<i>No Data Available</i>
pH	<i>Not Applicable</i>
Melting point	-108 °C
Boiling Point	49 °C [@ 760 mmHg]
Flash Point	No flash point
Evaporation rate	> 1 [Ref Std:BUOAC=1]
Flammability (solid, gas)	Not Applicable
Flammable Limits(LEL)	None detected
Flammable Limits(UEL)	None detected
Vapor Pressure	40.4 kPa [@ 25 °C]
Vapor Density	11.6 [Ref Std:AIR=1]
Density	1.6 g/ml
Specific Gravity	1.6 [@ 68 °F] [Ref Std:WATER=1]
Solubility in Water	Nil
Solubility- non-water	<i>No Data Available</i>
Partition coefficient: n-octanol/ water	<i>No Data Available</i>
Autoignition temperature	<i>Not Applicable</i>
Decomposition temperature	<i>No Data Available</i>
Viscosity	0.6 centipoise [@ 25 °C]
Molecular weight	<i>No Data Available</i>
Volatile Organic Compounds	1600 g/l [Test Method:calculated SCAQMD rule 443.1]
Percent volatile	100 %
VOC Less H2O & Exempt Solvents	1600 g/l [Test Method:calculated SCAQMD rule 443.1]

SECTION 10: Stability and reactivity

10.1. Reactivity

This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4. Conditions to avoid

Light

10.5. Incompatible materials

Strong bases

Amines

Alcohols

10.6. Hazardous decomposition products**Substance**

Hydrogen Fluoride

Condition

At Elevated Temperatures - extreme conditions of heat

Refer to section 5.2 for hazardous decomposition products during combustion.

If the product is exposed to extreme condition of heat from misuse or equipment failure, toxic decomposition products that include hydrogen fluoride and perfluoroisobutylene can occur. Extreme heat arising from situations such as misuse or equipment failure can generate hydrogen fluoride as a decomposition product.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects**Signs and Symptoms of Exposure**

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:

No known health effects.

Skin Contact:

Contact with the skin during product use is not expected to result in significant irritation.

Eye Contact:

Contact with the eyes during product use is not expected to result in significant irritation.

Ingestion:

No known health effects.

Toxicological Data

If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

Name	Route	Species	Value
1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Dermal	Professional judgement	LD50 estimated to be > 5,000 mg/kg
1,1,1,2,2,4,3,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Ingestion	Professional	LD50 estimated to be > 5,000 mg/kg

		Judgement	
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation-Vapor (4 hours)	Rat	LC50 = 1,227 mg/l

ATE = acute toxicity estimate

Skin Corrosion/Irritation

Name	Species	Value
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Rabbit	No significant irritation

Serious Eye Damage/Irritation

Name	Species	Value
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Rabbit	No significant irritation

Skin Sensitization

Name	Species	Value
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Guinea pig	Not classified

Respiratory Sensitization

For the component/components, either no data are currently available or the data are not sufficient for classification.

Germ Cell Mutagenicity

Name	Route	Value
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	In Vitro	Not mutagenic
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	In vivo	Not mutagenic

Carcinogenicity

For the component/components, either no data are currently available or the data are not sufficient for classification.

Reproductive Toxicity

Reproductive and/or Developmental Effects

Name	Route	Value	Species	Test Result	Exposure Duration
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	Not classified for female reproduction	Rat	NOAEL 3,000 ppm	pre-mating & during gestation
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	Not classified for male reproduction	Rat	NOAEL 3,000 ppm	pre-mating & during gestation
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	Not classified for development	Rat	NOAEL 3,000 ppm	pre-mating & during gestation

Target Organ(s)

Specific Target Organ Toxicity - single exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	nervous system	Not classified	Rat	NOAEL 100,000 ppm	2 hours
1,1,1,2,2,4,3,3,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	cardiac sensitization	Not classified	Dog	Sensitization Negative	17 minutes

3M™ Novec™ 1230 Fire Protection Fluid	07/25/18
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pentanone						
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Specific Target Organ Toxicity - repeated exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3-pentanone	Inhalation	liver / kidney and/or bladder / heart / endocrine system / hematopoietic system / muscles / nervous system / respiratory system / vascular system	Not classified	Rat	NOAEL 3,000 ppm	90 days

Aspiration Hazard

For the component/components, either no data are currently available or the data are not sufficient for classification.

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

SECTION 13: Disposal considerations

13.1. Disposal methods

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

Dispose of waste product in a permitted industrial waste facility. As a disposal alternative, incinerate in a permitted waste incineration facility. Combustion products will include HF. Facility must be capable of handling halogenated materials. Empty drums/barrels/containers used for transporting and handling hazardous chemicals (chemical substances/mixtures/preparations classified as Hazardous as per applicable regulations) shall be considered, stored, treated & disposed of as hazardous wastes unless otherwise defined by applicable waste regulations. Consult with the respective regulating authorities to determine the available treatment and disposal facilities.

EPA Hazardous Waste Number (RCRA): Not regulated

SECTION 14: Transport Information

For Transport Information, please visit <http://3M.com/Transportinfo> or call 1-800-364-3577 or 651-737-6501.

SECTION 15: Regulatory information

15.1. US Federal Regulations

Contact 3M for more information.