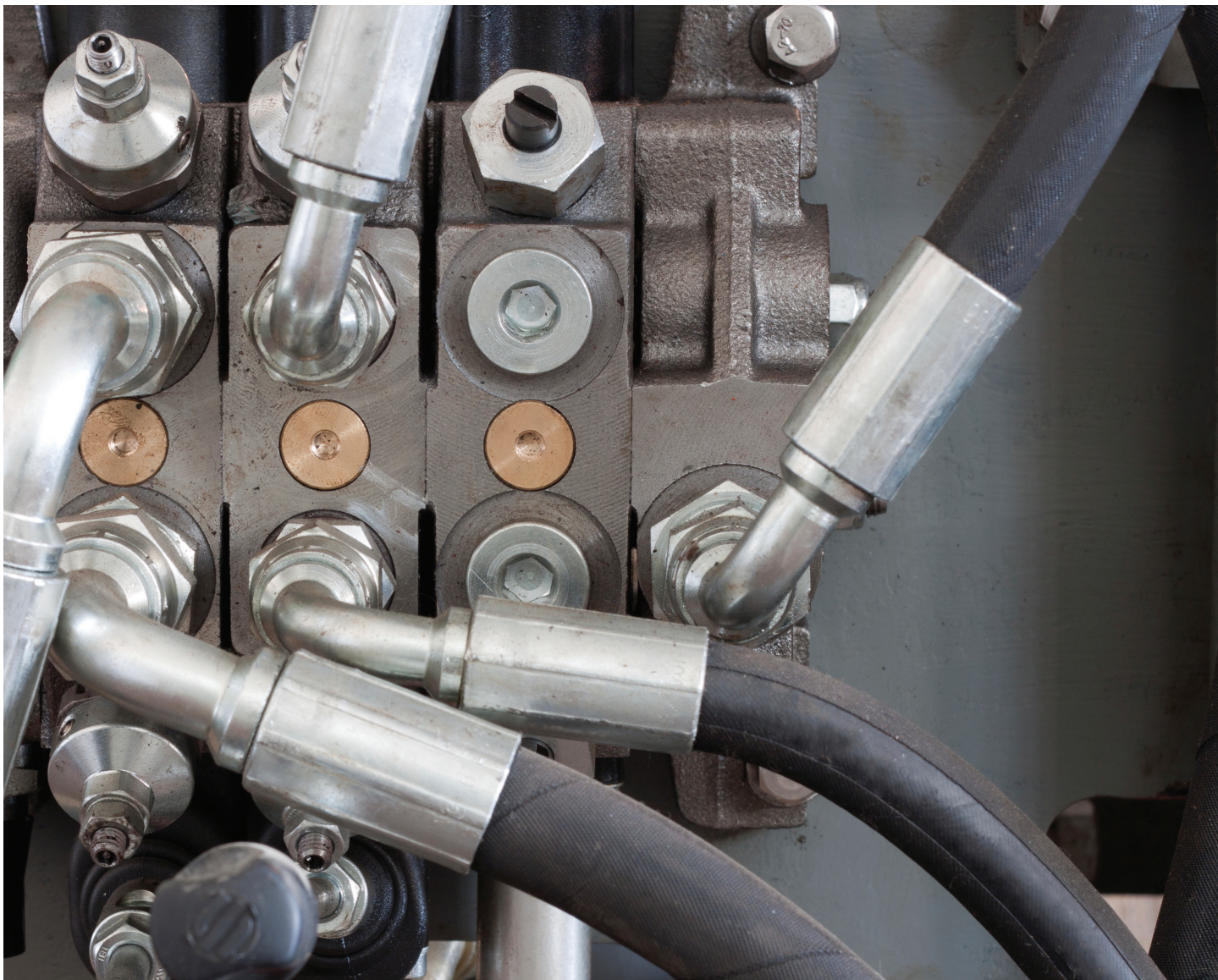




Industrial Solutions | Performance Lubricants

UCON TRIDENT™ AW Hydraulic Fluids



Product Description

UCON TRIDENT™ AW Hydraulic Fluids are high performance hydraulic fluids designed for demanding industrial applications requiring environmental sensitivity, water solubility, fire resistance, and excellent anti-wear properties over wide temperature ranges. These polyalkylene glycol (PAG) based fluids, which are available in three viscosity grades, are anhydrous (water-free). UCON TRIDENT AW Hydraulic Fluids do not break down to form sludge, and they do not hydrolyze in the presence of water. Furthermore, because of their high viscosity indices and excellent low temperature characteristics, one UCON TRIDENT viscosity grade fluid may replace two or three viscosity grade mineral oils to provide high performance across all seasons. These hydraulic fluids are ideal for use in applications such as dockside/marine, forestry, amusement, and industrial operations.

Table of Contents

Features and Benefits 2

Typical Properties 3

Viscosity Grade Selection. 4

Hydraulic System Conversion. 4

Compatibility 5

Regulatory and Disposal 5

Environmental Data. 6

Spill Data 7

Product Safety 8

Emergency Service 8

Contact. 8

Features and Benefits

Excellent Anti-Wear Performance – UCON TRIDENT™ AW Hydraulic Fluids have demonstrated exceptional load-carrying capabilities and are specially formulated (with no zinc or other metal additives) to provide effective corrosion protection and anti-wear performance in hydraulic systems. They are rated as anti-wear (AW) fluids according to ASTM D7043 testing and FZG testing, which means the potential for greater operating reliability, less downtime, and lower maintenance costs.

Clean, Long-Lasting Operation – When proper fluid and equipment maintenance procedures are followed, UCON TRIDENT™ AW Hydraulic Fluids offer a long service life and operating reliability, lower maintenance costs, and reduced overall downtime. Because UCON TRIDENT Fluids are water-soluble, shop and equipment cleanup is easier than the cleanup of conventional oil fluids.

Fire Resistance – High flash and fire points provide safety in applications calling for fire resistant fluids, thus providing operating confidence and potentially reduced insurance costs. FM Approvals, using FM test method 6930, has classified UCON TRIDENT™ 46 AW and 68 AW Hydraulic Fluids as “Approved Industrial Fluids”.

All Season Performance – UCON TRIDENT™ AW Hydraulic Fluids have high viscosity indices and low pour points, allowing year-round usage and eliminating seasonal changeovers. One UCON TRIDENT Fluid can replace two or three viscosity grade oils, thereby reducing seasonal fluid purchase and disposal costs, lowering maintenance costs, and requiring less downtime.

Biodegradability – UCON TRIDENT™ 32, 46 and 68 AW Hydraulic Fluids are readily biodegradable according to OECD 301F.

Non-Sheening – UCON TRIDENT™ fluids do not cause a sheen or discoloration on the surface of the water or adjoining shorelines that would violate local water quality standards.

Aquatic Toxicity – UCON TRIDENT™ AW Hydraulic Fluids are “Practically Non-Toxic” to fish and other aquatic wildlife according to the U.S. Fish and Wildlife Service hazard classification.

High Waste Treatability – UCON TRIDENT™ Hydraulic Fluids are highly waste-treatable. In tests simulating the discharge of industrial waste streams to unacclimated municipal treatment plants (POTWs), UCON TRIDENT 32 AW Hydraulic Fluid demonstrated no adverse impact on either the proper functioning or performance of the waste treatment systems, even at high discharge levels.

Typical Properties

	UCON TRIDENT™ AW Hydraulic Fluid			
Performance Properties	32	46	68	Test Method
FZG Visual Gear Test, Stages Passed	12	12	12	ASTM D5182
Four Ball EP Test				ASTM D2783
Load Wear Index	32.94	33.10	33.26	
Last Non-seizure, 80 kg (mm scar)	0.40	0.40	0.39	
Last Seizure, 126 kg (mm scar)	2.75	2.60	2.53	
Weld Load, kg	160	160	160	
V104 Vane Pump Test (total mg wear)	<10	<10	<10	ASTM D7043
35 VQ Vickers Vane Pump Test ¹	Pass	—	—	M-2950-S
Individual Cartridge Wear, mg	8, 8, 8	—	—	
Average Wear, mg	8	—	—	
Sonic Shear Stability				ASTM D5621
Initial Viscosity @ 40°C (cSt)	36.8	47.1	68.9	
Irradiated Viscosity @ 40°C (cSt)	36.9	47.0	69.2	ASTM D5621
Viscosity Properties				
Viscosity @ 40°C (cSt)	35.4	46.0	68.0	ASTM D445
Viscosity @ 100°C (cSt)	8.0	9.8	13.7	ASTM D445
Viscosity @ 0°C (cSt)	294	390	614	ASTM D445
Viscosity Index	194	200	209	ASTM D2270
Fire Properties				
Flash Point – Cleveland Open Cup, °C	271	312	288	ASTM D92
Flash Point – Pensky Martens Closed Cup, °C	218	223	None ²	ASTM D93
Fire Point, °C	304	316	322	ASTM D92
FM Approvals ³	—	Approved	Approved	Test Standard 6930
Physical-Chemical Properties				
Specific Gravity @ 20°C	1.031	1.035	1.041	ASTM D1298
Foam Test –				ASTM D892
Sequence I, Initial Volume/ml	10/0	10/0	10/0	
Sequence II, Initial Volume/ml	10/0	10/0	10/0	
Sequence III, Initial Volume/ml	10/0	10/0	10/0	
Vapor Pressure (mm Hg)	<0.01	<0.01	<0.01	ASTM E1719
Specific Heat (Cal/g/°C)	0.476	0.481	0.478	ASTM E1269
Pour Point, °C	-59	-51	-51	ASTM D97
Ash Content (%)	0.011	0.008	0.008	ASTM D482
Corrosion Protection (TORT)	Pass	Pass	Pass	ASTM D665A
Copper Strip Corrosion	1b, shiny	1a, shiny	1a, shiny	ISO 2160
Aging Behavior (Hrs)				DIN 51587
mg KOH/g	1.14	0.92	0.31	
Hours	1,008	1,008	1,008	
Coefficient of Expansion				ASTM D1903
@ 20°C	0.00078	0.00080	0.00079	
@ 55°C	0.00080	0.00078	0.00078	
Weight, lbs/gal. (20°C)	8.57	8.57	8.58	

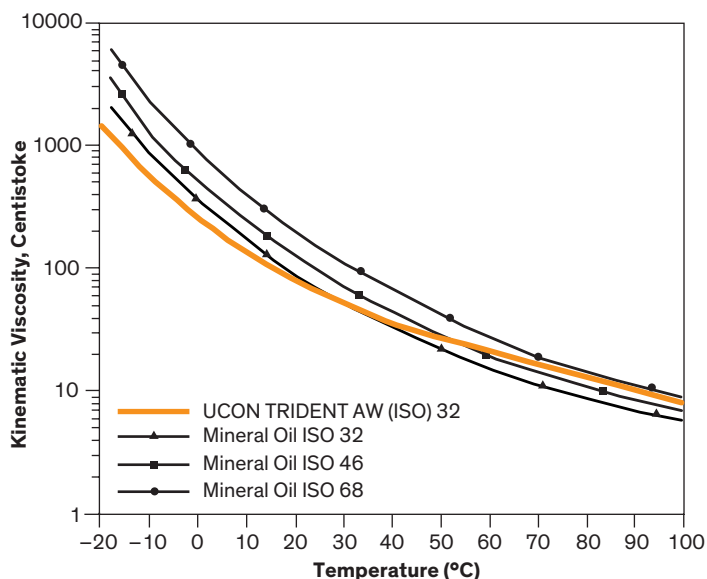
¹ Southwest Research² No flash observed³ FM Approvals, Test Standard for Flammability of Industrial Fluids, Class Number 6930, January 2002

These are typical properties, not to be construed as specifications.

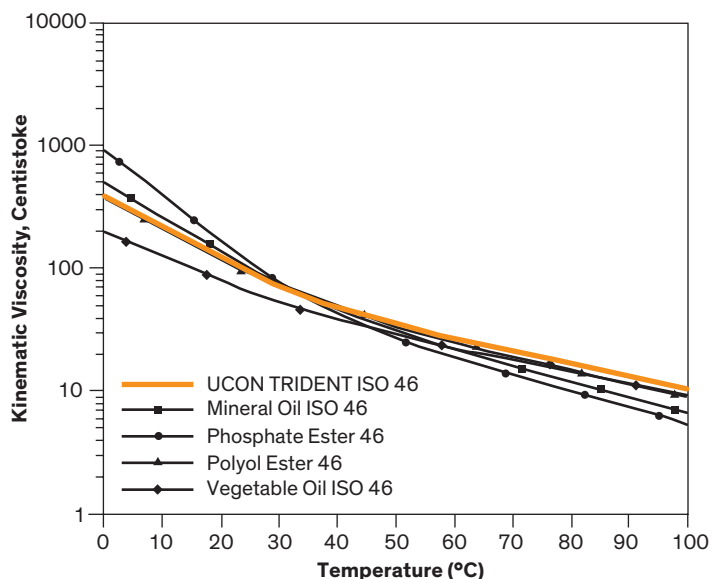
Viscosity Grade Selection

The following graphs can be used to assist in selection of the appropriate fluid viscosity grade given the hydraulic system operating temperature. They also illustrate that UCON TRIDENT™ Fluids have a higher viscosity index (flatter curve) than some other classes of fluids, and thus, one UCON TRIDENT Fluid may replace two or three oil viscosity grades.

UCON TRIDENT™ AW 32 Hydraulic Fluid vs. Mineral Oil Hydraulic Fluids



UCON TRIDENT™ AW 46 Hydraulic Fluid vs. Various ISO 46 Fluids



Hydraulic System Conversion

For best results when converting to a UCON TRIDENT™ AW Hydraulic Fluid, ensure the following:

- The hydraulic system is thoroughly clean and free of contamination from previous fluids
- Oil filters are new
- Paint, plastics, seals and elastomers are compatible
- Standard industry procedures are followed

Conversion to a UCON TRIDENT™ Hydraulic Fluid

Installation of UCON TRIDENT Hydraulic Fluid into systems that previously contained petroleum-based hydraulic fluid should follow the recommended flush procedure below:

- Drain previous fluid from the equipment.
- Replace fluid filters.
- Fill the system with the UCON TRIDENT Fluid to be used. Run or circulate under minimum load for 24 hours. UCON TRIDENT™ Fluid will generally clean varnish and sludge build-up formed from petroleum-based hydraulic fluids.
- Thoroughly drain the UCON TRIDENT Fluid from the system while still warm.
- Inspect the fluid filters and replace as needed.
- Fill the equipment with fresh UCON TRIDENT Fluid and begin normal operation.
- Inspect and change filters as required.

Contact your technical representative for assistance and detailed information on conversion procedures.

Compatibility

Other Hydraulic Fluids

UCON TRIDENT™ AW Hydraulic Fluids are not compatible with hydrocarbon-based hydraulic fluids. As with any fluid conversion, recognized industry procedures including system cleanup and flushing should be followed.

Paints

PAG-based fluids show some solvency for common oil-based paints but minimal solvency for many epoxy-based paints. If interior surfaces of hydraulic system components are painted, it may still be possible to convert to a PAG fluid. Extra care should be taken to ensure that lifted paint trapped by the filter does not cause the pump to be starved of lubricant. Following the conversion, the painted surfaces should be carefully monitored for trends toward paint softening, lifting, and peeling. If paint removal does occur, frequent cleaning or replacement of filters may be required until the paint is completely removed.

Elastomers

UCON TRIDENT™ AW Hydraulic Fluids are suitable for use with many elastomeric materials used in seals and gaskets. Below is a partial list of compatible elastomers:

Viton®	EPR	EPDM
Kalrez®	Butyl Rubber	Natural Black Rubber
Silicone	Buna N	Natural Red Rubber
Polysulfide	Fluoraz®	Aflas®

Because of the variations that can exist between elastomers in the same generic family, it is important to test the compatibility of specific elastomers that are to be used in a critical application.

Plastics

Compatibility should be assessed for any plastic components (such as reservoir sight glasses) exposed to a hydraulic fluid.

	25°C	100°C
Polypropylene	Recommended	Recommended
Polyethylene, Low Density	Recommended	Not Recommended
Homalite Polycarbonate	Not Recommended	Not Recommended
Lucite/Plexiglas Polymethylmethacrylate	Not Recommended	Not Recommended
Polyurethane	Not Recommended	Not Recommended

Because of the variations that can exist between plastics in the same generic family, it is important to test the compatibility of specific elastomers that are to be used in a critical application.

Viton® and Kalrez® are registered trademarks of E. I. du Pont de Nemours and Company
Fluoraz® is a registered trademark of Greene, Tweed & Co.
Aflas® is a registered trademark of Asahi Glass Co., Ltd.

Regulatory and Disposal

Requirements for reporting accidental fluid spills and discharges may vary from state to state and from municipality to municipality. It is important that you contact the appropriate authorities in your local area to clearly understand any reporting or other requirements.

Consult local sewage treatment plant authorities for regulations prior to disposing of any product. For guidance, contact your local Water Board, regional office of the Environmental Protection Agency, or appropriate regulatory authority.

Regulatory Information

- SARA Sections 302 and 304 Reportable Quantities for Extremely Hazardous Substances – **None**
- CERCLA Sections 102 and 103 (Reportable Quantities for Hazardous Substances) – **None**
- Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313 – **None**
- U.S. Toxic Substances Control Act
 - All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.
- European Inventory of Existing Commercial Chemical Substances (EINECS)
 - The components of this product are on the EINECS inventory or are exempt from inventory requirements.
- Canadian Domestic Substances List (DSL)
 - All substances contained in this product are not considered as Persistent, Bioaccumulative, and/or Inherently Toxic to the environment.
- California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
 - This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.
- Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List
 - This product does not contain chemicals at levels which require reporting under this statute.

Environmental Data

Readily Biodegradeable

Product	28 Day % Biodegradation*
UCON TRIDENT™ 32 AW	81
UCON TRIDENT™ 46 AW	72
UCON TRIDENT™ 68 AW	80

*All products are considered Readily Biodegradable and were tested via method OECD 301F.

Non-Sheening Passes Static Sheen Test (UCON TRIDENT™ 46 AW)

Test Method	Description	Results
Appendix 1 to Subpart A of 40 CFR 435	Static Sheen Test @ 23°C, 15 ml sample, distilled water, 15 minutes observation time	Observations: No sheen, No gloss, No increase in reflectivity, No color, No iridescence, No oil slick

Environmental Classifications

Classified as chemicals rather than oils for industrial lubricants.

- Not subject to OPA 90 requirements
 - The USCG maintains a list of materials that are regulated as oils under OPA 90 (see <http://homeport.uscg.mil>). UCON TRIDENT™ fluids do not include any materials listed by USCG*.
 - UCON TRIDENT fluids do not cause a sheen or discoloration on the surface of the water or adjoining shorelines that would violate local water quality standards
- UCON TRIDENT fluids may be subject to local chemical management requirements.

*Note the U.S. Coast Guard and the EPA have differing definitions of oil.

Biochemical Oxygen Demand

Product	BOD5	BOD10	BOD20	BOD28
UCON TRIDENT™ 32 AW	0.00	-4.44	65.68	69.14
UCON TRIDENT™ 46 AW	-0.50	-3.99	60.29	67.76
UCON TRIDENT™ 68 AW	0.00	-1.91	43.40	71.53

Toxicity Results for Aquatic Species

Product	Fresh Water Species		Sea Water Species	
	48 h EL50 (mg/L) with water flea (<i>Daphnia magna</i>)	96 h LL50 (mg/L) with Fathead minnow (<i>Pimephales promelas</i>)	96 h LL50 (mg/L) with Mysid shrimp (<i>Mysidopsis bahia</i>)	96 h LL50 (mg/L) with Sheepshead minnow (<i>Cyprinodon variegatus</i>)
UCON TRIDENT™ 32 AW	750	‡	200	>1000
UCON TRIDENT™ 46 AW	430	297	250	>1000
UCON TRIDENT™ 68 AW	170	‡	330	>1000

**All products are considered Practically Non-Toxic according to U.S. Fish & Wildlife Service Research Information Bulletin No. 84-78 (August, 1984). Testing of these formulations was performed according to U.S. EPA and OECD methods, and in compliance with their associated Good Laboratory Practice guidelines. Testing is performed after removal (membrane filtration) of insoluble components, with effects reported on the basis of nominal loading rate of the whole formulation.

EL50 = TRIDENT™ loading rate (mg/L as formulated fluid) associated with effects on 50% of tested population

LL50 = TRIDENT™ loading rate (mg/L as formulated fluid) associated with lethality of 50% of tested population

‡ Not tested. TRIDENT™ 32 AW and 68 AW are expected to have fathead minnow LL50 values similar to that of 46 AW, based on similar results observed across these products for the other species tested.

Classified as “Practically Non-Toxic”

U.S. Fish & Wildlife Service Classification Based on inherent properties of the fluid and testing following the:

- U.S. EPA. Ecological Effects Test Guidelines, OPPTS 850.1010, Aquatic Invertebrate Acute Toxicity Test, Freshwater Daphnids
- U.S. EPA. Ecological Effects Test Guidelines, OPPTS 850.1035, Mysid Acute Toxicity Test
- U.S. EPA. Ecological Effects Test Guidelines, OPPTS 850.1075, Fish Acute Toxicity, Freshwater and Marine
- U.S. EPA. Ecological Effects Test Guidelines, OPPTS 850.1000, Special Considerations for Conducting Aquatic Laboratory Studies
- OECD Series on Testing and Assessment, No. 23, Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures

Classified as “Environmentally Acceptable”

Issued under the EPA Clean Water Act, the 2013 Vessel General Permit (VGP) regulates incidental discharges to the normal operation of commercial vessels (including vessels being used as a means of transportation) greater than or equal to 79 feet in length. All vessels MUST use an Environmentally Acceptable Lubricant (EAL) in all oil to sea interfaces unless technically infeasible. “Environmentally acceptable lubricants” means lubricants that are “biodegradable” and “minimally-toxic” and are “not bioaccumulative”. Dow’s UCON TRIDENT™ AW Hydraulic Fluids meet the EPA’s definition of Environmentally Acceptable Lubricants, making UCON TRIDENT a solution for VGP compliance for vessel owners and operators.

Spill Modeling Data

Product Spill Modeling (UCON TRIDENT™ 46 AW)

Distance (miles) and time (hours) to which the peak concentration of a UCON TRIDENT spill is practically non-toxic to humans and aquatic species.

		Model Input					Model Results			
	River	River			Spill		Human Toxicity		Aquatic Toxicity	
Scenario Description	Location	Flow Rate (ft ³ /s)	Width (ft)	Depth (ft)	Volume (gal)	Mass (lb)	Distance to 600 mg/L	Travel Time (hrs)	Distance to EL50 of 430 mg/L	Travel Time (hrs)
Large River, Large Spill	Mississippi River at Tarbert Landing, MS	501,800	3700	27	1000	8591	0.034	0.01	0.05	0.01
		501,800	3700	27	7000	60134	0.24	0.07	0.32	0.09
Small River, Small Spill	Soldier Creek Near Grove, KS	15.9	19.6	0.9	20	172	0.054	0.09	0.09	0.15
		15.9	19.6	0.9	100	859	1.19	1.94	1.67	2.7

Scenario Spill Modeling

The following tables can be used to evaluate a potential spill scenario based on river flow, volume spilled, and maximum allowed concentration. Select the maximum allowed spill concentration based on the toxicity threshold of the most sensitive species of concern in proximity to the spill. For a variety of spill volumes per river, the flow scenario, distance (in miles) and travel time (in hours) to reach chemical peak concentration are provided.

1. Mississippi River: flow 501,800 ft³/s

	Concentration					
Spill Volume (gal)	1,000 mg/L	750 mg/L	500 mg/L	250 mg/L	100 mg/L	
7500	0.15	0.21	0.3	0.59	1.5	Distance (mi)
	0.04	0.06	0.09	0.17	0.43	Travel time (hr)
1000	0.02	0.03	0.04	0.08	0.2	Distance (mi)
	0.01	0.01	0.01	0.02	0.06	Travel time (hr)
500	<0.01	<0.01	0.02	0.04	0.1	Distance (mi)
	<0.01	<0.01	0.01	0.01	0.03	Travel time (hr)
50	<0.02	<0.02	<0.02	<0.02	<0.02	Distance (mi)
	<0.01	<0.01	<0.01	<0.01	<0.01	Travel time (hr)
5	<0.02	<0.02	<0.02	<0.02	<0.02	Distance (mi)
	<0.01	<0.01	<0.01	<0.01	<0.01	Travel time (hr)

2. Kanawha River (medium size river): flow 14,785 ft³/s

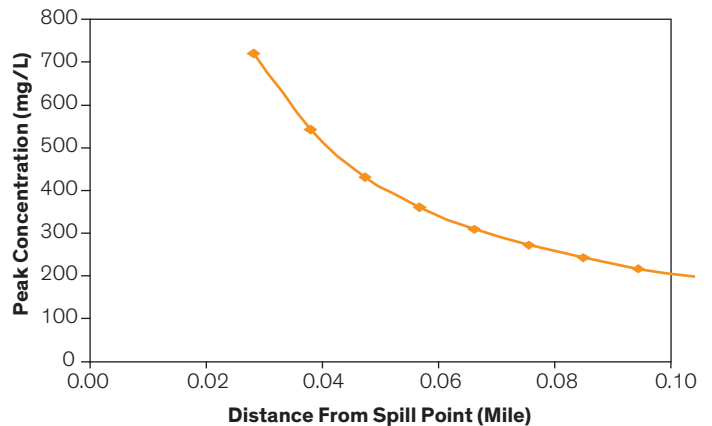
	Concentration					
Spill Volume (gal)	1,000 mg/L	750 mg/L	500 mg/L	250 mg/L	100 mg/L	
500	0.11	0.15	0.22	0.38	0.78	Distance (mi)
	0.06	0.08	0.11	0.2	0.4	Travel time (hr)

3. Soldier Creek: flow 15.9 ft³/s

	Concentration					
Spill Volume (gal)	1,000 mg/L	750 mg/L	500 mg/L	250 mg/L	100 mg/L	
50	0.11	0.19	0.43	1.8	10	Distance (mi)
	0.17	0.3	0.7	3	16	Travel time (hr)
5	<0.05	<0.05	<0.05	<0.05	0.11	Distance (mi)
	<0.09	<0.09	<0.09	<0.09	0.17	Travel time (hr)

The following graph depicts a generic profile for the peak concentration of a spill vs. distance from a river spill site.

Peak Concentration vs. Distance from Spill



It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial and local laws.

Product Safety

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

Emergency Service

Dow maintains a 24-hour emergency service for its products. The American Chemistry Council (CHEMTREC) and Transport Canada (CANUTEC) also maintain 24-hour emergency service:

Location	Dow Product	All Chemical Products (in case of emergency)
United States and Puerto Rico	800-DOW CHEM	Phone CHEMTREC: 800-424-9300
Canada	519-339-3711 (collect)	Phone CANUTEC: 613-996-6666 (collect)
Europe, Middle East, North and Central Africa	49 41 469 12333	
Latin America, Asia/Pacific, South Africa and any other location worldwide	Phone United States: 989-636-4400	

At sea, radio U.S. Coast Guard, who can directly contact Dow...800-DOW CHEM or CHEMTREC...800-424-9300.

DO NOT WAIT. Phone if in doubt.

You will be referred to a specialist for advice.

US, Canada & Mexico:

Toll-free 1-800-447-4369

Europe:

Toll-free +800 3 694 6367

Call +31 11567 2626

Asia Pacific:

Toll-free +800 7776 7776

Call + 60 3 7965 5392

Latin America:

Call +55 11 5188 9222

www.dow.com/ucon

NOTICE: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.