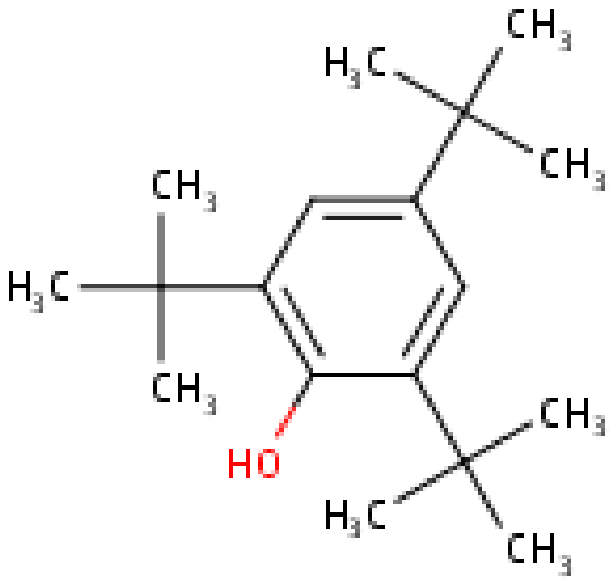
Preliminary Information on Manufacturing, Processing, Distribution, Use and Disposal:

2,4,6-Tris(tert-butyl)phenol

CASRN: 732-26-3



August 2017

Support document
For Docket EPA-HQ-OPPT-2016-0734

This document provides a preliminary public summary of available information collected by EPA's Office of Pollution Prevention and Toxics (OPPT) in the Office of Chemical Safety and Pollution Prevention (OCSPP) on the manufacturing (including importing), processing, distribution in commerce, use, and disposal of this chemical. This is based on existing data available to EPA, including information collected under the Chemical Data Reporting rule, Toxics Release Inventory (if available), information from other Agency databases, other U.S. Government agencies, publicly available information from states, and a review of published literature. In addition, the document includes information reported to EPA by producers and users of the chemical in the United States and in other countries.

This preliminary use information and any additional use information received in the docket by December 9, 2017, will inform efforts to identify, under section 6(h)(1)(B) of the Toxic Substances Control Act (TSCA), whether exposure to this chemical is likely, under the conditions of use, either to the environment, the general population, or to a potentially exposed or susceptible subpopulation identified by EPA. The information will also inform any risk management efforts following the exposure and use assessment under TSCA section 6(h)(1)(B).

Mention of trade names in this document does not constitute endorsement by EPA. To verify products or articles containing this chemical currently in commerce, EPA has identified several examples. Any lists are provided for informational purposes only. EPA and its employees do not endorse any of the products or companies.

This document does not contain confidential business information (CBI).

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CONTACT

Todd Coleman, National Program Chemicals Division, Office of Pollution Prevention and Toxics. 202-564-1208, Coleman.Todd@epa.gov

Peter Gimlin, National Program Chemicals Division, Office of Pollution Prevention and Toxics. 202-566-0515, Gimlin.Peter@epa.gov

Docket: EPA-HQ-OPPT-2016-0734

MANUFACTURING, PROCESSING, DISTRIBUTION, USE, AND DISPOSAL

1. Manufacturing (Including Importing)

For the 2016 Chemical Data Reporting (CDR) period, data reported indicate that there is one company manufacturing or importing 2,4,6-TTBP in the United States [1],[2]. The volume of 2,4,6-TTBP manufactured was claimed as confidential business information (CBI).

There is no Toxics Release Inventory (TRI) data available for this chemical as it is not required to be reported under TRI.

PubChem reported that in 2006, 2,4,6-TTBP was produced in a production range between 10 and less than 50 million pounds[3].

According to the EPA's 2009 Screening-Level Hazard Characterization - Alkylphenols Category 2,4,6-TTBP had an aggregate production and/or import volume in the U.S. of between 10 million and 50 million pounds[4].

Manufacturing Process

2,4,6-TTBP has been listed as an impurity in 2,6-di-tert-butylphenol and may be a byproduct in the manufacture of 4-tert-butylphenol[5].

2,4,6-TTBP can also be obtained from 2,4-di-tert-butylphenol; 4-tert-butylphenol; and 2-tert-butylphenol at different proportions given specific reaction conditions. 3-tert-butylphenol can also be obtained from mixtures containing 2,4,6-TTBP and other phenols[6].

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[1]Manufacturers (including importers) are required to report under CDR if they meet certain production volume thresholds, generally 25,000 lb or more of a chemical substance at any single site. Reporting is triggered if the annual reporting threshold is met during any of the calendar years since the last principal reporting year. In general, the reporting threshold remains 25,000 lb per site. However, a reduced reporting threshold (2,500 lb) now applies to chemical substances subject to certain TSCA actions. https://www.epa.gov/chemical-data-reporting/how-report-under-chemical-data-reporting

[2] Manufacture means to manufacture, produce, or import for commercial purposes. Manufacture includes the extraction, for commercial purposes, of a component chemical substance from a previously existing chemical substance or complex combination of chemical substances. (40 CFR 711.3)
epa.gov/sites/production/files/2015-12/documents/cdr_fact_sheet_importers_final_dec2015_0.pdf[2]

[3] National Institutes of Health, PubChem Database, https://pubchem.ncbi.nlm.nih.gov/compound/2_4_6-Tri-tert-butylphenol#section=Top (accessed December 20, 2016)

[4] U.S. EPA. 2009. Screening-Level Hazard Characterization (Alkylphenols Category), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.175.5613&rep=rep1&type=pdf

[5] Convention for the Protection of the Marine Environment of the North Atlantic (OSPAR), 2,4,6-tri-tert-butylphenol, (OSPAR Commission, 2006 update) 274/2006, http://www.ospar.org/documents?v=6977

[6] Fiege, H., Voges, H. W., Hamamoto, T., et al. 2000. Phenol Derivatives. *Ullmanns Encyclopedia of Industrial Chemistry.*

2. Processing

For the 2016 CDR period, data reported indicate that this chemical is processed[7] for the following:

- As a reactant or intermediate in the following sectors:
  - Basic organic chemical manufacturing
- Both commercial and consumer uses were reported in the category:
  - Fuels and related products.

2,4,6-TTBP has been noted by the National Library of Medicine in ToxNet as the starting material for the synthesis of 2,6-di-tert-butyl-4-methoxyphenol, which is noted as a powerful antioxidant[8].

3. Products and Articles

A 1995 U.S. Patent Number 5,399,275 by the Lubrizol Corporation notes the use of 2,4,6-TTBP at a concentration of 15% under the category: "environmentally friendly viscosity index improving compositions". Lubrizol Corporation was noted as a holder of patents that use the Isonox 133 chemical at different concentrations in their manufactured products[9].

2,4,6-TTBP is mentioned in 1,829 additional patents according to NIH's PubChem[10].

EPA identified the following types of products based on a search of available sources for products containing 2,4,6-TTBP. EPA and its employees do not endorse any of the products or companies.

Table 1. List of Products

Trade Name	Use of product	% by weight of chemical	Link to references, SDS or industry information
Ethanox 4760E	Automotive	5.5%	http://www.sfm.state.or.us/CR2K_SubDB/MSDS/ETHANOX_4760_E.PDF
Arctic Cat Fuel Injector Cleaner	Automotive	<0.1%	http://arcticcatlubricants.com/wp-content/uploads/2014/04/10144-Arctic-Cat-Fuel-Injector-Cleaner-07092015.pdf
Tolad 3915	Automotive; Industrial	10-30%	http://hazard.com/msds/f2/clc/clcxy.html

[7] The term "process" means the preparation of a chemical substance or mixture, after is manufacture, for distribution in commerce—

- in the same form or physical state as, or in a different form or physical state from, that in which it was received by the person so preparing such substance or mixture, or
- as part of an article containing the chemical substance or mixture.

http://uscode.house.gov/view.xhtml?path=/prelim@title15/chapter53&edition=prelim

[8] U.S. National Institutes of Health ToxNet Toxicology Data Network, https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@rn+@rel+732-26-3 (accessed December 20, 2016)

[9] Lange, R. M., Seebauer, J. G., and Mamajek, C. A. (1995). Environmentally Friendly Viscosity Index Improving Compositions. U.S. Patent 5,399,275, filed Dec. 10, 1993 and issued Mar. 21, 1995, https://www.google.com/patents/US5399275?cl=en

[10] National Institutes of Health, PubChem Database - Patents, https://pubchem.ncbi.nlm.nih.gov/compound/12902#section=Patents (accessed December 20, 2016)

Trade Name	Use of product	% by weight of chemical	Link to references, SDS or industry information
BG CF5 Fuel Supplement	Automotive	0.1-1%	https://www.amazon.com/BG%ADCF5%ADFuel%ADSystem%ADTreatment/dp/B005GDZPCY
Regular Unleaded Petrol	Automotive	*concentrations above the limit of detection	http://caltex.co.nz/resources/msds/
Casite Injector Sting/Complete Fuel System Cleaner	Automotive	<1%	http://mymotorhoney.com/wp-content/uploads/2016/04/C175-12_C177-12_Casite-Injector-Sting-Complete-Fuel-System-Cleaner.pdf
CHAMPION ® Fuel Stabilizer	Automotive	0-3%	http://championbrands.com/MSDS/4205M-Champion%20Fuel%20Stabilizer%20MSDS.pdf
CHAMPION ® Engine Oil Additive	Automotive	<1%	http://www.championbrands.com/MSDS/BT-engine-protect.pdf
Max 44E	Automotive	<0.1%	http://msdsdigital.com/max-44e-msds
Fuel Stabilizer	Automotive	<0.018%	http://cyclo.com/wp-content/uploads/2015/12/C290-C292_SDS_May2014.pdf
Marine Fuel Stabilizer	Automotive; Marine	0.02%	http://msds.rowleys.com/cm5210.pdf
Ionol BF 200	Antioxidant	<20%	http://www.ingurumena.ejgv.euskadi.eus/r49-564/es/contenidos/informacion/planta_biodiesel_puerto_bilbao/es_13530/adjuntos/10059-AAI-AnexoA-GV-Nov2005.pdf
1170 Power Stroker	Automotive	<0.5%	http://wcs.mi.safeschoolssds.com/document/repo/5855ad74-748f-11df-9b6e-d8d230712f36
Eurol SR 2000 Road Racing	Automotive	0.1 – 1%	http://www.eurol.com/en/productfiles/85914-en_e128906_eurol-sr-2000-road-racing_sds_eurol_11.html
Briggs and Stratton Fuel Fit	Automotive; Industrial	Not reported	http://www.centralspares.co.uk/files/downloads/BS992380%20Briggs%20and%20Stratton%20fuel%20fit.pdf
Octamar LI-5 Plus	Automotive	0.09-0.99%	https://www.fuelcare.com/pdf/octamarmsds.pdf
WERCS Sta-Bil Fuel Stabilizer	Automotive; Marine	3% (Isonox 133 mixture)	http://www.homedepot.com/catalog/pdfImages/a6/a6e7aab1-a183-46c9-a3c6-f590e516a377.pdf
Durad® AX22 Liquid Phenolic Antioxidant	Automotive; Industrial	Not reported	http://lpq.com.mx/pdf/Durad%20AX22.pdf
McCullock Fuel Stabiliser	Automotive; Industrial	>0.25 - <1%	http://www.mcculloch.com/ddoc/MCCE/MCCE2015_AAen/MCCE2015_AAen_McCulloch%20Fuel%20Stabiliser_.pdf
Total Fuel System Cleaner	Automotive	<1%	http://www.hyperlube.com/c3/total-fuel-system-cleaner-c9.html
STOK 9	Automotive	<1%	http://www.champ-energie.fr/sites/default/files/fds_stok9_vs3.1_fr.pdf

Trade Name	Use of product	% by weight of chemical	Link to references, SDS or industry information
Mile Hi	Automotive	Not Reported	http://www.conncoll.edu/media/website-media/offices/ehs/envhealthdocs/Mile-Hi.pdf http://www.certifiedlabs.com/certified/productView_byName.asp?country=USA&language=&language_id=4&product_cat=name&product_cat_desc=Products+By+Name&pName=MILE+HI+RTU
Antioxidant No. 37 (AO-37)	Automotive; Aviation	15%	http://www.certifiedlabs.com/certified/productView_byName.asp?country=USA&language=&language_id=4&product_cat=name&product_cat_desc=Products+By+Name&pName=MILE+HI+RTU
Jet Fuel JET A-1	Automotive; Aviation	0 – 0.0031%	http://www.orlenlietuva.lt/EN/ForBusiness/Products/Documents/JET%20A-1%20%20MSDS%20%202016%20%20ORLEN%20%20Lietuva%20_en.pdf
Carburetor and fuel injector cleaner	Automotive	0.1 – 1%	https://rislone.com/ca/wp-content/uploads/2015/04/34705-SDS.pdf
Fuel Injector Cleaner	Automotive	≤2.5%	https://rislone.com/sv/wp-content/uploads/2016/03/51701-51732-English-SDS.pdf
Rislone ® Fuel Injector Cleaner with Upper Cylinder Lubricant	Automotive	<3%	https://www.whatsinproducts.com/files/brands_pdf/1396211702.pdf
Yinox 333	Coating	Not reported	http://www.seechem.com/catalogue_m.pdf
6729 Concentrate for low sulfur fuel oil	Automotive; Industrial	0.1 – 1%	http://images.raiffeisen.com/Raicom/sdb/444/aral_konzentrat_schwefelarmes_heizoel_d.pdf
Isonox 133	Chemical Intermediate	20% mixture of 732-26-3 and 2-(1,1-dimethylethyl)phenol	Schenectady Chemicals, Inc. Section 8(e) Coordinator (CAP Agreement). ISONOX 133 February 25, 1992, Public Docket Number 8EHQ-0292-2314
LGEM 2	Lubricating Grease	0.1-1%	http://www.skf.com/us/products/lubrication-solutions/lubricants/safety-data-sheets/index.html
TY26275 (Gasoline Storage Stabilizer)	Automotive	<5%	http://www.greenpartstore.com/assets/images/bulletins/2011/ty26275_msds.pdf
RAO-038	Analytical Standard	NL	http://siri.org/msds/f1/bvk/bvkqg.html
Diesel Fuel Stabiliser	Automotive; Industrial	0.1-1%	http://msdsdigital.com/system/files/DIESEL_FUEL_STABILISER_English.pdf

4. Distribution (Includes Retailers)

General internet searches for distributors of 2,4,6-TTBP in raw form yielded many vendors selling various quantities (i.e., between one milligram and 9071.85 kilograms) at different purities (i.e., between 90% and 99%). Note that these are defined as distributors due to their marketing of 2,4,6-TTBP for sale and distribution; however, many may also be the manufacturers of 2,4,6-TTBP. Table 2

below illustrates the identified distributors of 2,4,6-TTBP in raw form. This list is provided for informational purposes only. EPA and its employees do not endorse any of the products or companies.

Table 2. List of Distributors

Given Name	Available Quantities	Purity (%)	Reference
2,4,6-tris(tert-butyl)phenol	VQ	96%	http://www.abcr.de/shop/en/2-4-6-Tri-tert-butyl-phenol-96.html/
2,4,6-tris(tert-butyl)phenol	5 to 500 grams	UP	https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	1 to 1,000 gram package	97%	http://www.amadischem.com/en/198540.htm
2,4,6-tris(tert-butyl)phenol	VQ	98%	http://ahhchemical.com/search.shtml
2,4,6-tris(tert-butyl)phenol	VQ	98%	https://aksci.com/item_detail.php?cat=P329
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://akoscompounds.de/catalogue/akossampleretrieval-s.php?IDNUMBERS=AKOS002268919&TERM-732-26-3&CIDcount+1
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.ambitner.com/reference/2543595
2,4,6-tris(tert-butyl)phenol	1 to 100 grams	95%	http://www.acccorporation.com/products/CHM0007865
2,4,6-tris(tert-butyl)phenol	25 to 500 grams	UP	https://chem-space.com/search/58582eb3-2a8cf8-a15015b-df81da0/CSC000068363.html?currency=usd https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	VQ	97%	http://aokchem.com/aokdetail.php?id-8866
2,4,6-tris(tert-butyl)phenol	100 grams	95%	http://www.arkpharminc.com/product/detail/AK114270.html
2,4,6-tris(tert-butyl)phenol	25 to 100 grams	92 to 95%	http://online.aurorafinechemicals.com/StrSearch-new.asp
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.bepharm.com/web/en/product/pro_item.aspx?id=B66408
2,4,6-tris(tert-butyl)phenol	100 grams	95+/-%	http://www.bidepharmatech.com/en/product/detail/BD66408.html https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	VQ	UP	https://www.biosynth.com/products/organic-synthesis/basic-intermediates/products/W-104462.html
2,4,6-tris(tert-butyl)phenol	25 to 500 grams	UP	https://chem-space.com/search/58582eb3-2a8cf8-a15015b-df81da0/CSC000068363.html?currency=usd
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.chembopharma.com/product/65415.html
2,4,6-tris(tert-butyl)phenol	VQ	Distributor of Angene, Ark Pharm, and Biocore products	https://chem-space.com/search/58582eb3-2a8cf8-a15015b-df81da0/CSC000068363.html?currency=usd
2,4,6-tris(tert-butyl)phenol	5 to 1,000 grams	98%	http://www.combi-blocks.com/cgi-bin/find.cgi?QB-5132

Given Name	Available Quantities	Purity (%)	Reference
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://discofinechem.com/products/246-tri-tert-butylphenol/
2,4,6-tris(tert-butyl)phenol	25 to 500 grams	UP	http://product.b2star.com/192163.htm
2,4,6-tris(tert-butyl)phenol	VQ	Distributor of Acros, Angene, Ark, Bide, Combi-Blocks, Manchester Organics, Matrix Scientific, OxChem, TCI America	https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	VQ	95%	http://enovationchem.com/productDetails.asp?cellC=+bgcolor%3D%27%23E8F8FF%27+&productID=K73850
2,4,6-tris(tert-butyl)phenol	VQ	98%	http://www.finetechnology-ind.com/product/All%20product%20List/732-26-3.html
2,4,6-tris(tert-butyl)phenol	5 to 500 grams	95%	http://fluorochem.co.uk/Products/Search?searchType=C&searchText=732-26-3
2,4,6-tris(tert-butyl)phenol	VQ	99+%	https://georganics.sk/products/speci/2,4,6-Tri-tert-butylphenol.php
2,4,6-tris(tert-butyl)phenol	NL	NL	http://www.chinadayangchem.com/product/18448-it.html
2,4,6-tris(tert-butyl)phenol	VQ	98%	http://www.jalor-chem.com/jldetailpro.php?id=102297
2,4,6-tris(tert-butyl)phenol	VQ	Distributor of Adamas, Bide, Meryer, and TCI America	http://www.bidepharmatech.com/en/product/detail/BD66408.html
2,4,6-tris(tert-butyl)phenol	25 grams	99.5%	https://lgcstandards.com/HK/en/2-4-6-Tri-tert-butylphenol/p/DRE-C17667700
2,4,6-tris(tert-butyl)phenol	250 grams	UP	https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	100 grams	95%	http://www.matricscientific.com/099057.html
2,4,6-tris(tert-butyl)phenol	1 to 10 milligrams	90%	https://mcule.com/MCULE-7929720338
2,4,6-tris(tert-butyl)phenol	25 to 500 grams	98%	http://www.bidepharmatech.com/en/product/detail/BD66408.html
2,4,6-tris(tert-butyl)phenol	100 grams	95+%	https://mcule.com/MCULE-7929720338
2,4,6-tris(tert-butyl)phenol	100 grams	95+%	https://www.molport.com/shop/moleculelink/2-4-6-tri-tert-butylphenol/519180
2,4,6-tris(tert-butyl)phenol	100 grams	UP	https://orderbb.emolecules.com/search/#?query=732-26-3&system-type=BB&p=1
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.oxchem.com/ox/Product/pro_item.aspx?num=AX8066408
2,4,6-tris(tert-butyl)phenol	50 grams (VQ)	UP	https://www.pfaltzandbauer.com/Search.aspx

Given Name	Available Quantities	Purity (%)	Reference
2,4,6-tris(tert-butyl)phenol	1 to 3 grams	>90%	https://www.molport.com/shop/moleculelink/2-4-6-tri-tert-butylphenol/519180
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.rosewachem.com/732-26-3.html
2,4,6-tris(tert-butyl)phenol	VQ	UP	https://www.ryansci.com/products/7645732/view
2,4,6-tris(tert-butyl)phenol	100 grams	UP	https://www.scbt.com/scbt/product/2-4-6-tri-tert-butylphenol-732-26-3
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.etradeasia.com/products_detail/0/1011138/4133/2_4_6_tri_tert_butylphenol_CAS_732_26_3_Pharmaceutical_Intermediate.html
2,4,6-tris(tert-butyl)phenol	9071.85 kilograms (10 tons)	99%	http://www.ichemical.com/chemicals/cas-732-26-3
2,4,6-tris(tert-butyl)phenol	NL	≥99%	http://www.chinaseniorsupplier.com/Environment/Catalysts_Chemical_Auxiliary_Agents/401209807/ANTIOXIDANT_SONOX_246.html
2,4,6-tris(tert-butyl)phenol	100 grams	95%	http://sigmaaldrich.com/catalog/search?interface=CAS+No.&term=732-26-3&N=0&mode=partialmax&focus=product&lang=en&region=US
2,4,6-tris(tert-butyl)phenol	25 grams	98%	https://www.spectrumchemical.com/OA_HTML/chemical-products_246-Tri-tert-butylphenol_TCI-T0359.jsp?minisite=10020&respid=22372
2,4,6-tris(tert-butyl)phenol	10 to 100 milligrams	UP	https://www.molport.com/shop/moleculelink/2-4-6-tri-tert-butylphenol/519180
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.syntree.com/index.php?route=product/search=732-26-3
2,4,6-tris(tert-butyl)phenol	NL	NL	https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@rn+@rel+732-26-3
2,4,6-tris(tert-butyl)phenol	25 grams	98%	http://tcichemicals.com/eshop/en/us/commodity/T0359/
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.thsci.com/732-26-3.html
2,4,6-tris(tert-butyl)phenol	VQ	UP	http://www.wonder-chem.com/product/310061.html

VQ – varied quantities
UP – unknown purity
NL – not listed information

Vendors also offer commercial/retail products that are mixtures of several chemicals, including 2,4,6-TTBP. Table 3 below shows products containing 2,4,6-TTBP at various concentrations and in proprietary blends available for general consumer purchase online. This list is provided for informational purposes only. EPA and its employees do not endorse any of the products or companies.

Table 3. List of Products Available in Commerce

Product	Description and Price	Reference
Arctic Cat, Inc. Arctic Cat Fuel Injector Cleaner	Fuel additive, conditioner, and stabilizer 12 ounces – $8.99	http://arcticcatlubricants.com/wp-content/uploads/2014/04/10144-Arctic-Cat-Fuel-Injector-Cleaner-07092015.pdf
BG BG CF5 Fuel System Treatment	Fuel system treatment 11 ounces – $14.78	https://www.amazon.com/BG%ADCF5%ADFuel%ADSystem%ADTreatment/dp/B005GDZPCY
Champion Brands, LLC CHAMPION ® Fuel Stabilizer	Fuel additive and stabilizer 8 ounces – $5.23 96 ounces - $62.76	http://championbrands.com/MSDS/4205M-Champion%20Fuel%20Stabilizer%20MSDS.pdf
Cyclo Industries, Inc. C-290/292 Fuel Stabilizer	Fuel additive and stabilizer 96 ounces - $58.56	http://cyclo.com/wp-content/uploads/2015/12/C290-C292_SDS_May2014.pdf
Eurol Lubricants Briggs and Stratton Fuel Fit	Fuel additive, conditioner, and stabilizer 8 ounces – $16.84	http://www.centralspares.co.uk/files/downloads/BS992380%20Briggs%20and%20Stratton%20fuel%20fit.pdf
Fuelcare, LTD Octamar LI-5 Plus	Fuel preservative 34 ounces – $24.37	https://www.fuelcare.com/pdf/octamarmsds.pdf
Gold Eagle - WERCS Sta-Bil Fuel Stabilizer	Fuel additive and stabilizer 8 ounces – $15.00 10 ounces – $12.00 32 ounces – $21.00 40 ounces – $20.00 128 ounces – $75.00 1 gallon – $63.00	http://www.homedepot.com/catalog/pdfImages/a6/a6e7aab1-a183-46c9-a3c6-f590e516a377.pdf
Rislone Rislone ® Fuel Injector Cleaner with Upper Cylinder Lubricant	Fuel additive, conditioner, and stabilizer 6 ounces - $3.18 72 ounces - $48.00	https://www.whatsinproducts.com/files/brands_pdf/1396211702.pdf
SKF Maintenance Products LGEM 2	Bearing lubricant 14 ounces - $27.36	http://www.skf.com/us/products/lubrication-solutions/lubricants/safety-data-sheets/index.html

5. Uses

Industrial Uses

As noted above, for the 2016 CDR period, data reported to EPA indicate that this chemical is processed as a reactant or intermediate in the basic organic chemical manufacturing sector. Additionally, both commercial and consumer uses were reported in the category fuels and related products.

Industry has reported to EPA that 2,4,6-TTBP has historically been used as a reactant, an intermediate, a product in organic chemical manufacturing, and as an antioxidant in plastic and resin manufacturing.

Commercial and Consumer Uses

As noted previously, for the 2016 CDR period, both commercial and consumer uses were reported to EPA in the category fuels and related products.

2,4,6-TTBP has been noted as an ingredient in automobile fuel injector cleaners, as well as in lubricant additives and fuel additives (as an antioxidant) in gasoline and jet fuel[11].

As indicated in Table 1 and Table 3, some of these fuel additive products are available to consumers for automotive, marine or miscellaneous small engine uses.

Potential Other Uses

In 2008, Environment Canada reported in its Screening Assessment of 2,4,6-TTBP that the substance had historically been used as a lubricant additive and it was currently used in Canada as a fuel, oil, and gasoline additive. It was also reported that several additional use pattern codes and corresponding applications were noted in 2001 and 2007 surveys, including: feedstock fuels, chemical intermediates, pesticides, fertilizers, salt for deicing, solvents, cutting fluids, aerosol propellants, hydraulic fluids, lubricants and additives, cleaning/washing agents and additives, plant protection products, agricultural products, explosives, antioxidants, corrosion inhibitors, tarnish inhibitors, scavengers, and anti-scaling agents[12],[13].

According to the Convention for the protection of the Marine Environment (OSPARCommission) in 2006, possible applications of 2,4,6-TTBP in Denmark, Norway and Sweden include a chemical intermediate in the production of antioxidants used in rubber and plastic, a lubricating agent in the transportation sector, a by-product in the production of 4-tert-butylphenol, as an additive for gasoline and fuel oil distillate, and in the offshore sector[14].

From 1998 to 2014 the Swedish Chemicals Agency flow analysis for chemical substances listed 2,4,6-TTBP in a category of 52 “butylphenols” used in 2763 products; 440 of which are consumer specific products[15].

According to the Substances in Preparation in Nordic Countries (SPIN) database, 2,4,6-TTBP has been reportedly used in industrial use (NACE) classifications between 2001 and 2014 for:

- Wholesale and retail trade and repair of motor vehicles (NACE Code G45),
- Manufacture of machinery and equipment (NACE Code C28),

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[11] DeLima Associates. Consumer Product Information Database. https://www.whatsinproducts.com/chemicals/view/1/4995/000732-26-3/Polyolefin%20alkyl (accessed December 16, 2016) and U.S. National Institutes of Health ToxNet Toxicology Data Network, http://toxnet.nlm.nih.gov (accessed December 20, 2016)

[12] Environment Canada & Health Canada, Screening Assessment for the Challenge – Phenol, 2,4,6-tris(1,1-dimethylethyl)-(2,4,6-tri-tert-butylphenol). November 2008, https://www.ec.gc.ca/ese-ees/92E21475-4289-446B-BCDA-E3E71BB93EF2/batch2_732-26-3_en.pdf

[13] November 17, 2001. Canadian Environmental Protection Act, 1999 – Notice with Respect to Certain Substances on the Domestic Substances List. *Canada Gazette: Part I*. 135:46; 4194.

[14] Convention for the Protection of the Marine Environment of the North Atlantic (OSPAR), 2,4,6-tri-tert-butylphenol, (OSPAR Commission, 2006 update) 274/2006, http://www.ospar.org/documents?v=6977

[15] Swedish Chemicals Agency (KEMI). Flow analysis for chemical substances – butyl phenols. (http://webapps.kemi.se/flodesanalyser/FlodesanalyserSchema.aspx?SchemaID=1401; accessed December 16, 2016)

- Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel (NACE Code 50),
- Construction (NACE Code 45),
- Manufacture of machinery and equipment (NACE Code 29), and
- Manufacture of coke, refined petroleum products, and nuclear fuel (NACE Code 23)[16]

According to a 2010 study of products in Norway, 2,4,6-TTBP was used in these applications:

- Additive in fuel, oil, gasoline, and lubricants,
- Phenolic resins (rubber/ink),
- Chemical intermediate (starting material for synthesis of 2,6-di-tert-butyl-4-methoxylphenol – antioxidant), and
- Additive to plastics (polymeric construction compounds used for flooring, pavement, sports grounds, drainage pipes, stabilizer for diene rubber, vulcanized rubber)[17]

Although importation, manufacture, and use of 732-36-3 is banned in Japan, the Japanese based National Institute of Technology and Evaluation found that 2,4,6-TTBP has been used as an antioxidant and additive (limited to those for lubricating and fuel oils) and in lubricating oils[18],[19].

The Australian Government Department of Health conducted a recent assessment under the National Industrial Chemicals Notification and Assessment Scheme that concluded the chemical may be used in Australia as an additive for hydrocarbon fuels and a component of industrial lubricants[20].

One vendor listed in Table 1 (Shandong Kanghong International Trade Company Limited) markets 2,4,6-TTBP as potentially being used for:

- antioxidant in rubber, plastics, and oil
- use in latex manufacture (borealis group)
- heat stabilizer for polyethylene, polypropylene, and high impact polystyrene[21]

[16]Substances in Preparations in Nordic Countries, http://www.spin2000.net/spinmyphp/?pid=732263 (accessed December 12, 2016)

[17]Lambert, N., Rostock, C., Bonden, A. (2010). Dodecyl- and tri-tert-butylphenol in Products in Norway. *Climate and Pollution Agency.* http://www.miljodirektoratet.no/old/klif/publikasjoner/2744/ta2744.pdf

[18]Government of Japan. 2007. Evaluation of Chemical Substances and Regulations of their Manufacture, etc. Cabinet Order No. 322 of 2007

[19]Environment Canada & Health Canada, Screening Assessment for the Challenge – Phenol, 2,4,6-tris(1,1-dimethylethyl)-(2,4,6-tri-tert-butylphenol). November 2008, https://www.ec.gc.ca/ese-ees/92E21475-4289-446B-BCDA-E3E71BB93EF2/batch2_732-26-3_en.pdf

[20]Australian Government Department of Health. 2016. National Industrial Chemicals Notification and Assessment Scheme Environmental Tier II Assessment for Phenol, 2,4,6-tris(1,1-dimethylethyl), https://www.nicnas.gov.au/chemical-information/imap-assessments/imap-assessments/tier-ii-environment-assessments/2-4-6-tri-tert-butylphenol

[21]eTrade Asia website. Shandong Kanghong International Trade Company Limited order for 732-26-3. (http://www.etradeasia.com/products_detail/0/1011138/4133/2_4_6_tri_tert_butylphenol_CAS_732_26_3_Pharmaceutical_Intermediate.html; accessed December 19, 2016)

Another vendor (Shanghai Yancui Import and Export Co., Ltd.) markets 2,4,6-TTBP (known as Antioxidant Sonox 246 or Antioxidant 744) as suitable for use in natural and synthetic rubbers, glues, polyolefins plastics, and the main raw material of efficient phosphite antioxidants[22].

6. Disposal of Waste and Recycling/Recovery

2,4,6-TTBP is not listed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA).

USEFUL TYPES OF INFORMATION

This document presents a summary of information currently available to EPA on this chemical. EPA is interested in obtaining information to more fully characterize the manufacturing, processing, distribution, disposal, and use of this chemical, to inform the development of the exposure and use assessment for this chemical, and to inform any subsequent risk management efforts. For example, EPA is interested in obtaining information on:

- the functional uses for this chemical;
- what types of products contain this chemical;
- which industry sectors use this chemical;
- what volume of the chemical is used;
- which uses have been discontinued or phased out;
- exposure scenarios for this chemical; and
- in which articles this chemical is found.

[22]Shanghai Yancui Import and Export Co., Ltd. Product details. (http://www.chinaseniorsupplier.com/Environment/Catalysts_Chemical_Auxiliary_Agents/401209807/ANTIOXIDANT_SONOX_246.html; accessed December 12, 2016)

APPENDIX: SOURCES CONSULTED

- U.S. EPA *Chemical Inventory*
  https://www.epa.gov/tsca-inventory
- U.S. EPA *ChemView*
  https://java.epa.gov/chemview
- TRI P2 information
  https://www.epa.gov/toxics-release-inventory-tri-program/pollution-prevention-p2-and-tri
- U.S. EPA *HPV HC* (access through Chemical Data Access Tool – CDAT)
  https://java.epa.gov/oppt_chemical_search/
- U.S. EPA *HPVIS* and *HPV HC* (access through Chemical Data Access Tool – CDAT)
  https://java.epa.gov/oppt_chemical_search/
- DfE Alternatives Assessments
  https://www.epa.gov/saferchoice/design-environment-alternatives-assessments
- Safer Chemical Ingredients List
  https://www.epa.gov/saferchoice/safer-ingredients
- Green Chemistry awards
  https://www.epa.gov/greenchemistry/presidential-green-chemistry-challenge-winners
- Greener products and services
  https://www.epa.gov/greenerproducts/identify-greener-products-and-services
- Pollution Prevention
  https://www.epa.gov/p2/pollution-prevention-case-studies
  https://www.epa.gov/p2/grant-programs-pollution-prevention#sra
  https://www.epa.gov/p2/pollution-prevention-tools-and-calculators
- U.S. EPA *InertFinder*
  https://iaspub.epa.gov/apex/pesticides/f?p=101:1:
- U.S. EPA *Pesticide Chemical Search*
  https://iaspub.epa.gov/apex/pesticides/f?p=CHEMICALSEARCH:1:0::NO:1::
- U.S. EPA *Endocrine Disruptor Screening Program*
  https://www.epa.gov/ingredients-used-pesticide-products/endocrine-disruptor-screening-program-tier-1-assessments
- U.S. EPA *Hazardous Waste*
  https://www.epa.gov/hw/learn-basics-hazardous-waste#regulations
- U.S. EPA *Superfund chemical data matrix*
  https://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm-query
- U.S. EPA *Hazardous Air Pollutants*
  https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications
- U.S. EPA *Significant New Alternatives Policy (SNAP)*
  https://www.epa.gov/snap
- U.S. EPA *Volatile Organic Compounds*
  https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds#definition
- U.S. EPA *Toxic and priority pollutants under the Clean Water Act*
  https://www.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act#toxic

- U.S. EPA *Contaminant Candidate list under the Safe Drinking Water Act*
  https://www.epa.gov/ccl/contaminant-candidate-list-3-ccl-3#chemical-list
- U.S. EPA *IRIS Assessment*
  https://cfpub.epa.gov/ncea/iris2/atoz.cfm
- U.S. EPA *SRS*
  https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/substancesearch/search.do
- U.S. EPA *Chemical and Product Categories (CPCat) Database*
  https://actor.epa.gov/cpcat/faces/home.xhtml
- U.S. National Library of Medicine *ChemIDplus*
  https://chem.sis.nlm.nih.gov/chemidplus/
- U.S. National Library of Medicine *Hazardous Substance Data Bank (HSBD)*
  https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
- U.S. Department of Health & Human Services *Household Products Database*
  https://hpd.nlm.nih.gov/index.htm
- OSHA *Chemical Hazards and Toxic Substances*
  https://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html
- NIOSH Workplace Safety and Health Topics *Chemicals*
  http://www.cdc.gov/niosh/topics/chemical.html
- NIOSH *Pocket Guide to Chemical Hazards*
  http://www.cdc.gov/niosh/npg/npgdcas.html
- CPSC *Chemicals*
  http://www.cpsc.gov/en/Research--Statistics/Chemicals/
- CPSC *FHSA*
  https://www.cpsc.gov/Business--Manufacturing/Business-Education/Business-Guidance/FHSA-Requirements/
- Food and Drug Administration *List of Databases*
  http://www.fda.gov/ForIndustry/FDABasicsforIndustry/ucm234631.htm
- NTP (National Toxicology Program) *Substances studied by NTP*
  http://ntpsearch.niehs.nih.gov/?e=True&ContentType=Testing+Status
- Department of Energy *Protective Action Criteria Database*
  http://energy.gov/ehss/protective-action-criteria-pac-aegls-erpgs-teels-rev-29-chemicals-concern-may-2016
- California Department of Toxic Substances Control *Toxics in Products*
  http://www.dtsc.ca.gov/PollutionPrevention/ToxicsInProducts/index.cfm
  http://www.dtsc.ca.gov/SCP/CandidateChemicalsList.cfm
  http://www.dtsc.ca.gov/SCP/WhatIsAPriorityProduct.cfm
- California Office of Environmental Health Hazard Assessment *Proposition 65*
  http://oehha.ca.gov/proposition-65/chemicals
  http://oehha.ca.gov/proposition-65/proposition-65-list
- California Office of Environmental Health Hazard Assessment *Biomonitoring*
  http://biomonitoring.ca.gov/chemicals
- California *permissible exposure limits for chemical contaminants*
  https://www.dir.ca.gov/title8/5155table_ac1.html
- California *hazardous substance list*

https://www.dir.ca.gov/title8/339.html

- California *Safe Cosmetics Program – list of chemical agents known or suspected to cause cancer or developmental or other reproductive harm.*
  http://www.cdph.ca.gov/programs/cosmetics/Pages/default.aspx
  https://safecosmetics.cdph.ca.gov/search/Default.aspx
- Maine *chemicals of high concern*
  http://www.maine.gov/dep/safechem/highconcern/
- Massachusetts *Toxics Use Reduction Act (TURA) (link includes a link to Higher hazard substances list)*
  http://www.mass.gov/eea/waste-mgnt-recycling/toxics/toxic-use-reduction/toxics-use-reduction-act/
- Massachusetts *Complete list of TURA chemicals*
  http://www.mass.gov/eea/agencies/massdep/toxics/tur/toxics-use-reduction-act-tura-reporting-and-fees.html
- Lowell Center for Sustainable Production *Chemical, Policy and Science Initiative*
  http://www.chemicalspolicy.org/chemicalspolicy.us.state.database.php
- Minnesota Department of Health *Toxic Free Kids Act Chemicals of High Concern*
  http://www.health.state.mn.us/divs/eh/hazardous/topics/toxfreekids/highconcern.html
- Michigan *Environmental Health Topics*
  http://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_74881-13050--,00.html
- New Hampshire *Regulated Toxic Air Pollutants*
  http://des.nh.gov/organization/commissioner/legal/rules/documents/env-a1400.pdf
- New Jersey *Right to Know Hazardous Substances*
  http://web.doh.state.nj.us/rtkhsfs/rtkhsl.aspx
- Oregon *Priority Persistent Pollutants (in water)*
  http://www.deq.state.or.us/wq/SB737/
- Oregon *Pollutant Profiles*
  http://www.deq.state.or.us/wq/SB737/docs/LegRpAtt420100601.pdf
- Oregon *Reducing Toxics in Oregon*
  http://www.oregon.gov/deq/Pages/ToxicsReduction.aspx
- Oregon *Chemicals of Concern for Children's Health*
  http://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/ToxicSubstances/Pages/childrens-chemicals-of-concern.aspx
- Pennsylvania Department of Labor and Industry *Hazardous Substance List*
  http://www.pacode.com/secure/data/034/chapter323/chap323toc.html
- Rhode Island *Air Resources – Air Toxics*
  http://www.dem.ri.gov/pubs/regs/regs/air/air22_08.pdf
- Vermont *Chemical Disclosure Program for Children's Products*
  http://www.healthvermont.gov/enviro/chemical/cdp.aspx
- Washington *Chemicals of High Concern to Children*
  http://www.ecy.wa.gov/programs/hwtr/rtt/cspa/chcc.html
- Washington *Children's Safe Products Act*
  http://apps.leg.wa.gov/RCW/default.aspx?cite=70.240
- Washington Department of Labor & Industries *SHARP Publications*
  http://www.lni.wa.gov/Safety/Research/Pubs/default.asp

- National Conference of State Legislatures
  http://www.ncsl.org/research/environment-and-natural-resources/state-chemical-statutes.aspx
- Canada *Chemicals Portal*
  http://chemicalsubstanceschimiques.gc.ca/index-eng.php
- EU *ECHA website*
  https://echa.europa.eu/
- Australia *NICNAS Chemical Information*
  https://www.nicnas.gov.au/chemical-information
- Japan *Chemical Risk Information Platform (CHIRP)*
  http://www.nite.go.jp/en/chem/chrip/chrip_search/systemTop
- OECD *eChemPortal*
  http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- Royal Society of Chemistry *ChemSpider* http://www.chemspider.com/
- Stockholm Convention on Persistent Organic Pollutants
  http://chm.pops.int/TheConvention/ThePOPs/ListingofPOPs/tabid/2509/Default.aspx
  http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx
- WHO IPCS (UN)
  http://www.who.int/ipcs/en/
- Other – worker protection information
  http://www.dguv.de/ifa/gestis/gestis-internationale-grenzwerte-fuer-chemische-substanzen-limit-values-for-chemical-agents/index-2.jsp
- DeLima Associates *Consumer Product Information Database (CPID)*
  https://www.whatsinproducts.com/chemicals/index/1
- SRC *FatePointers Search Module PHYSPROP*
  http://esc.syrres.com/fatepointer/search.asp
- Product and company websites