FACTSHEET: PESTICIDES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Pesticides: This is a broadly applicable term for chemicals that are used to control "pests" (including insects, fungi, plants, rodents, birds, spiders and mites, etc.). Fact Sheets are also available for other specific types of pesticides (for example, organochlorine pesticides, triazines, pyrethroids).

Representative Chemicals: Lindane, methyl-parathion, permethrin, triazines

Potential Sources: Industrially manufactured chemicals and refined natural products.

Occurrence: A variety of different classes of pesticides have been detected in pre-treatment inflow and post-treatment outflow from wastewater treatment plants. Pesticides are also often detected in runoff from agriculture and consumer use of pesticides.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Pesticides vary, depending on the chemical, in terms of how long it lasts in the environment, the rate at which it breaks down, how well it dissolves in water, and whether it accumulates on the surface of the sediment.

Detection in Animals: Various types of pesticides have been detected in the tissues of invertebrates, fish, and marine mammals worldwide. Toxicity varies widely, depending on the specific pesticide and some (e.g., the chlorinated pesticides) tend to bioaccumulate in tissues; others may persist for long periods of time (typically years) in the environment.

Detection in Beluga Whales: Chlorinated pesticides have been measured in Cook Inlet beluga whales, including dichlorodiphenyltrichloroethane [DDT] and metabolites, chlordane-related compounds, Hexachlorobenzene [HCB], Hexachlorocyclohexane [HCH], dieldrin, and mirex. Chlorinated pesticides have also been detected in belugas in the St. Lawrence estuary, the Canadian Arctic, Svalbard, Norway, and the Arctic Ocean. Chlorinated pesticides in these other populations are associated with decreased immune systems and increased infections, and may be linked to reduced reproduction rates. No information is available regarding detections of organophosphate, triazine, or pyrethroid pesticides in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Pesticides are considered chemicals of possible concern due to their documented potential to adversely affect survival and reproduction.

Please note: All underlined terms are further defined on the back of this page

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FACTSHEET: PESTICIDES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

FACTSHEET: CHLORINATED PESTICIDES

Chemical of Probable Concern for Cook Inlet Beluga Whales

Chlorinated Pesticides: This class of chemicals is commonly used as pesticides. Many were banned in the United States in the 1970s, but are still used in other parts of the world.

Representative Chemicals: Dichlorodiphenyltrichloroethane (DDT), aldrin, dieldrin, chlordane, endosulfan, mirex, and toxaphene mixtures

Potential Sources: Pesticides used for insect control in agriculture and for public health (e.g., mosquito control).

Occurrence: Chemical testing at wastewater treatment plants nationwide found 21 pesticides including DDTs, aldrin, dieldrin, chlordanes, heptachlors, and benzene hexachloride (BHC) in pre-treatment inflowing water. Measurements of post-treatment outflowing water detected seven chlorinated pesticides including dieldrin, chlordane, heptachlor, BHC, and dichlorodiphenyldichloroethylene (DDE [a byproduct of DDT]). Dieldrin was also detected in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Chlorinated pesticides do not mix well with water and tend to accumulate on the surface of sediment particles.

Detection in Animals: Chlorinated pesticides have been detected in the tissues of invertebrates, fish, and marine mammals worldwide. They tend to bioaccumulate in tissues and may persist for long periods of time in the environment. Exposure to these chemicals is likely through prey (i.e., fish) which were likely exposed through air-borne contaminates and sediment. Chlorinated pesticides are known to cause developmental toxicity with long-term exposure; while, cancer and immune system effects are also possible. Chlorinated pesticides dissolve readily into fatty tissues and could potentially be transferred through milk to offspring. DDT has been measured in bottlenose dolphins, northern fur seals, California sea lions, and Southern sea otters. In California sea lions, DDT exposures were associated with premature births and kidney damage, and in otters, DDT exposures were associated with infectious diseases.

Detection in Beluga Whales: Fifteen chlorinated pesticides have been measured in Cook Inlet beluga whales, including DDT metabolites, chlordane-related compounds, hexachlorobenzene (HCB), hexachlorocyclohexane (HCH), dieldrin, and mirex. Chlorinated pesticides have also been detected in belugas in the St. Lawrence estuary, the Canadian Arctic, Svalbard, Norway, and the Arctic Ocean. Chlorinated pesticides in these other populations are associated with decreased immune systems, increased infections, and may be linked to decreased reproduction rates.

Potential Risk to Cook Inlet Beluga Whales: Chlorinated pesticides are considered chemicals of probable concern due to their ability to bioaccumulate, persist in the environment, potential to negatively impact growth and reproduction, and their documented presence in Cook Inlet beluga whales.

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Created 5/2011

FACTSHEET: CHLORINATED PESTICIDES

Chemical of Probable Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Developmental toxicity - any adverse effects resulting from a chemical exposure that would interfere with the reproductive ability of an organism or the development of its offspring, as a result of parental exposure, that can be manifested at any point in the lifespan of the organism.

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FACTSHEET: TRIAZINES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Triazines: This class of chemicals is commonly used as herbicides.

Representative Chemicals: Atrazine, cyanazine, simazine

Potential Sources: Industrially manufactured herbicides used for weed control.

Occurrence: Chemical testing at wastewater treatment plants across the country detected four types of triazines, including atrazines and simazine, in pre-treatment inflow and measurements in post-treatment outflow detected six triazines, including atrazines and simazines.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: These chemicals vary in how long they last in the environment, how they are broken down, how much they dissolve in water, and the extent to which they collect on the surfaces of liquids or solids within the environment. Triazines are moderately water soluble and may bioaccumulate.

Detection in Animals: Toxicity of triazines in aquatic life varies. They are highly toxic in algae, but acute toxicity is low in invertebrates and fish. There is no information available for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of trazines in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Triazines are considered chemicals of possible concern since there is limited potential for negative impacts on growth and mortality of beluga prey items, the chemicals do not persist long in the environment, and information is currently lacking for Cook Inlet.

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Created 5/2011

FACTSHEET: TRIAZINES

Chemical of Possible Concern for Cook Inlet Beluga Whales

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Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

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Created 5/2011

FACTSHEET: SYNTHETIC PYRETHROIDS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Synthetic Pyrethroids: This class of chemicals is commonly used in Pyrethrum-based broad-spectrum insecticides.

Representative Chemicals: Bifenthrin, cypermethrin, permethrins, esfenvalerate

Potential Sources: Industrially manufactured broad-spectrum insecticides.

Occurrence: Four permethrins have been detected in pre-treatment inflow and one permethrin has been detected in post-treatment outflow of wastewater treatment plants sampled across the United States. No information is available regarding detection in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: The behavior of synthetic pyrethroids in the environment varies depending on environmental factors such as suspended solid content and the pH of the receiving waters. Persistence ranges from low to moderate, depending on the chemical, while metabolism, dissolution, and adsorption vary.

Detection in Animals: There is no information available on synthetic pyrethroids in aquatic invertebrates or fish tissues in field studies. Acute toxicity in fish and invertebrates is moderate to high, and negative reproductive effects are possible. Toxicity in marine mammals is unknown and dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of synthetic pyrethroids in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Synthetic pyrethroids are considered chemicals of possible concern because while there is limited potential to impact the mortality and growth of beluga prey items, the chemicals do not persist long in the environment.

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Created 5/2011

FACTSHEET: SYNTHETIC PYRETHROIDS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

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Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Metabolism - chemical processes in which a living organism breaks down food for energy or synthesizes the compounds required for the maintenance of life

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Dose response - response of an organism when exposed to a chemical

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Created 5/2011

FACTSHEET: ORGANOPHOSPHATES/ CARBAMATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Organophosphates/ Carbamates: This class of chemicals is commonly used as broad-spectrum insecticides.

Representative Chemicals: Malathion, methyl-parathion, chlorpyrifos, diazinon, carbaryl, aldicarb

Potential Sources: These industrially manufactured insecticides are used in commercial agriculture and for residential use.

Occurrence: Several organophosphates/carbamates occurred in samples collected at wastewater treatment plants across the United States. Among the eight chemicals detected, Malathion, parathion, chlorpyrifos, and diazinon were found in pre-treatment inflowing water; four, including diazinon, were detected in the post-treatment outflow.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Organophosphates/carbamates are broken down at various rates, depending on the chemical; they dissolve in water and may collect on the surfaces of liquids or solids within the environment.

Detection in Animals: The only available information regarding the detection of organophosphates/carbamates is for fish and aquatic invertebrates, which show moderate to high acute toxicity.

Detection in Beluga Whales: No information is readily available.

Potential Risk to Cook Inlet Beluga Whales: Organophosphates/carbamates are considered chemicals of possible concern because while there is limited potential for negative impacts on growth and mortality, these chemicals do not persist in the environment, and information is not available for Cook Inlet.

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Created 5/2011

FACTSHEET: ORGANOPHOSPHATES/ CARBAMATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

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Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

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FACTSHEET: SURFACTANTS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Surfactants: This class of chemicals is commonly used in detergents, cosmetics, and spermicides.

Representative Chemicals: 4-nonylphenol; "alkylphenol polyethoxylate surfactants"; o-, m-, or p-nonylphenol

Potential Sources: Industrially manufactured for use in detergents, cosmetics and spermicides.

Occurrence: Phenolic surfactants have been detected in pre-treatment inflow and post-treatment outflow from wastewater treatment facilities, as well as in runoff. Airborne deposition of surfactants is possible and may be a significant source of surfactants in the environment.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Surfactants are generally water soluble, but their persistence in the environment is variable depending on the chemical's structure.

Detection in Animals: There is no information available regarding surfactants in aquatic invertebrates and fish tissue in field studies. Moderate acute toxicity and moderate to high chronic toxicity are possible in fish and invertebrates. Endocrine disruption effects are possible in fish. Toxicity in marine mammals includes possible endocrine disruption effects, dose response information is unavailable.

Detection in Beluga Whales: No information is readily available regarding the detection of surfactants in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Surfactants are considered chemicals of possible concern due to their potential to cause endocrine disruption and other possible adverse effects.

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Created 5/2011

FACTSHEET: SURFACTANTS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposure to a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response - response of an organism when exposed to a chemical

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FACTSHEET: ALKYLPHENOLS, ALKYLPHENOL ETHOXYLATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Alkylphenols, Alkylphenol Ethoxylates (APEs): This class of chemicals is commonly used in detergents and cleaning agents.

Representative Chemicals: Nonylphenol, octylphenol

Potential Sources: Industrially manufactured as stabilizers, emulsifiers, and dispersants for resins and plastics.

Occurrence: Four chemicals of this class have been detected in pre-treatment inflow and two were detected in post-treatment outflow of wastewater treatment plants tested across the United States. There is no information available regarding the presence of these chemicals in runoff; however, airborne deposition is possible.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: APEs dissolve well in fats and show low to moderate levels of bioaccumulation.

Detection in Animals: There is no information available regarding the detection of these chemicals in aquatic invertebrates or fish tissues in field studies, although there is evidence of moderate acute toxicity, moderate to high chronic toxicity and possible endocrine disruption effects in fish. Toxicity to marine mammals includes possible endocrine disruption, but dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of alkyphenols or APEs and in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Alkyphenols and APEs are considered chemicals of possible concern due to their potential to cause endocrine disruption and other adverse effects.

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FACTSHEET: ALKYLPHENOLS, ALKYLPHENOL ETHOXYLATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulation - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposures to a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response - response of an organism when exposed to a chemical

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

Created 5/2011

FACTSHEET: HEXABROMO-CYCLODODECANES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Hexabromocyclododecanes (HBCDs): This class of chemicals is commonly used as flame retardant coatings for thermal foams and furniture fabrics.

Representative Chemicals: C12H18Br6; 16 stereoisomeric forms (CAS# 25637-66-4)

Potential Sources: Industrially manufactured flame retardant coatings.

Occurrence: No information is readily available.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: This class of chemicals is persistent, bioaccumulates, and appears to biomagnify.

Detection in Animals: HBCDs have been detected in birds, terrestrial mammals, fish, and other aquatic organisms, and are known to cause death in invertebrates and in fish. Bioaccumulation in marine mammal tissues has been seen. Effects on terrestrial mammals may include developmental toxicity and endocrine disruption. There is no information available the effects of HBCDs and HBSDDs on marine mammals.

Detection in Beluga Whales: HBCD and other flame retardant chemicals (polybrominated diphenyl ethers [PBDEs] and fluorine-containing compounds) have been detected in Cook Inlet beluga whales. Cook Inlet beluga whales had higher levels of HBCD and slightly lower levels of PBDEs compared to belugas from the Chukchi Sea; no information is readily available for other beluga populations.

Potential Risk to Cook Inlet Beluga Whales: HBCDs are considered chemicals of possible concern due to their ability to bioacummulate and the potential for endocrine disruption and other adverse effects.

Please note: All underlined terms are further defined on the back of this page

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Created 5/2011

FACTSHEET: HEXABROMO-CYCLODODECANES

Chemical of Possible Concern for Cook Inlet Beluga Whales

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Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Biomagnify - the increasing concentration of a substance, such as a chemical, in the tissues of an organism at successively higher levels in the food chain

Developmental toxicity - any adverse effects resulting from a chemical exposure that would interfere with the reproductive ability of an organism or the development of its offspring, as a result of parental exposure, that can be manifested at any point in the lifespan of the organism.

Endocrine disruption - interference with the functions of hormones due to chemical exposure

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

Created 5/2011

FACTSHEET: CHLORINATED DIELECTRIC FLUIDS, TRANSFORMER OILS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Chlorinated dielectric fluids, transformer oils: This class of chemicals was commonly used as coolants and lubricants in transformers and other electrical equipment, but has been banned in the United States since the 1970s.

Representative Chemicals: 209 Polychlorinated biphenyl (PCB) congeners and Aroclor mixtures

Potential Sources: Electrical equipment, including transformers.

Occurrence: There is no information available on the presence of this class of chemicals in pre-treatment inflow or post-treatment outflow from wastewater treatment facilities. However, Aroclor and two PCBs have been found in samples of storm water runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: These types of chemicals do not mix well with water, but dissolve well in fat. They are long-lasting, degrade slowly, and are likely to bioaccumulate.

Detection in Animals: This class of chemicals has been detected in the tissues of invertebrates, fish, and marine mammals worldwide. In fish and invertebrates, acute toxicity may be low at environmental levels, but long-term exposure can cause developmental toxicity. Marine mammals are exposed to these chemicals through the food chain, with possible effects including cancer and suppression of the immune system. Research has shown these chemicals bioaccumulate in marine mammal tissue. PCBs have been found in bottlenose dolphins, harbor seals, northern fur seals, and California sea lions. In California sea lions, PCB exposures were associated with premature births and kidney damage.

Detection in Beluga Whales: Tissue samples from Cook Inlet beluga whales were tested for 31 PCB congeners. Concentration levels in males were higher than in females and were within the range where endocrine disruption might occur. However, levels were well below the approximate threshold level for effects on the immune system. Concentrations were also lower than seen in other stocks of beluga whales. PCBs have been detected in beluga whales in the St. Lawrence estuary, the Canadian and the Arctic Ocean, Svalbard, Norway, and Greenland.

Potential Risk to Cook Inlet Beluga Whales: Chlorinated dielectric fluids and transformer oils are considered chemicals of probable concern since they persist in the environment, bioaccumulate in marine mammal tissues, are known to adversely effect growth and reproduction, and have been documented in Cook Inlet beluga whales.

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Created 5/2011

FACTSHEET: CHLORINATED DIELECTRIC FLUIDS, TRANSFORMER OILS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Congeners - chemical compounds that are similar in composition and structure

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Developmental toxicity - any adverse effects resulting from a chemical exposure that would interfere with the reproductive ability of an organism or the development of its offspring, as a result of parental exposure, that can be manifested at any point in the lifespan of the organism.

Endocrine disruption - interference with the functions of hormones due to chemical exposure

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FACTSHEET: PERFLUORINATED COMPOUNDS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Perfluorinated compounds (PFCs): This class of chemicals is commonly used in fluoropolymers that repel water and oil; protective coatings in food contact packaging; textiles and carpeting; Teflon® coating; and grease-resistant food packaging.

Representative Chemicals: Perfluoro-octanoic acid (PFOA) and Perfluoro-octane sulfonates (PFOS)

Potential Sources: Industrially manufactured for use in various non-stick cookware and household applications.

Occurrence: No information is readily available.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: PFCs are persistent, bioaccumulate, and tend to repel water and fatty media.

Detection in Animals: PFCs have been detected in invertebrates, fish, and in marine mammal livers. PFOSs show low to moderate acute toxicity in fish and invertebrates, while PFOAs are less toxic and bioaccumulate less than PFOSs. It is thought that PFCs may cause developmental toxicity and endocrine disruption; dose response information is not available for marine mammals.

Detection in Beluga Whales: Fifteen perfluorinated compounds were detected in Cook Inlet beluga whales. No information is readily available regarding the detection of perflorinated compounds for other beluga populations.

Potential Risk to Cook Inlet Beluga Whales: PFCs are considered chemicals of possible concern due to their ability to bioacummulate and their potential for endocrine disruption and other adverse effects.

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Created 5/2011

FACTSHEET: PERFLUORINATED COMPOUNDS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Developmental toxicity - any adverse effects resulting from a chemical exposure that would interfere with the reproductive ability of an organism or the development of its offspring, as a result of parental exposure, that can be manifested at any point in the lifespan of the organism.

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response - response of an organism when exposed to a chemical

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This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

Created 5/2011

FACTSHEET: POLYBROMINATED FLAME RETARDANTS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Polybrominated flame retardants: This class of chemicals is commonly used as flame retardants in computers and textiles (polybrominated diphenyl ethers, PBDEs) and in construction and electrical equipment (polybrominated biphenyls, PBBs). PBBs are no longer produced in the United States.

Representative Chemicals: PBDEs, PBBs, Polybrominated dibenzo-p-dioxins (PBDDs)/ Polybrominated dibenzofurans (PBDFs), Hexabromocyclododecanes (HBCD)

Potential Sources: PBDEs and PBBs are industrially manufactured, while PBDDs and PBDFs come from the combustion of flame retardants. Airborne deposition may be a significant additional source of these chemicals.

Occurrence: Information regarding the presence of polybrominated flame retardants in sampled wastewater treatment plants was only available for PBDEs. However, eight congeners were detected in pre-treatment inflowing and post-treatment outflowing water.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Polybrominated flame retardants adhere to sediment, bioaccumulate in tissues, and persist in the environment for long periods of time.

Detection in Animals: Polybrominated flame retardants have been detected in invertebrate, fish, and marine mammal tissues. PBDEs show low acute toxicity in invertebrates and fish and under long-term exposure, larval development and population growth are affected. PBB effects on invertebrates and fish include binding to a specific protein in cells that affect gene expression during sensitive life stages. PBDD/PBDF toxicity in fish and invertebrates is probably similar to PBDEs and PBBs. Bioaccumulation in marine mammal tissue occurs with all of these chemicals, with possible effects including endocrine disruption, cancer, and suppression of the immune system.

Detection in Beluga Whales: PBDEs and other fire retardant chemicals (hexabromocyclododecane [HBCD] and fluorine-containing compounds) have been detected in Cook Inlet beluga whales. Cook Inlet beluga whales had slightly lower levels of PBDEs, but higher levels of HBCD compared to belugas from the Chukchi Sea. PBDEs have also been detected in St. Lawrence belugas but there is no information available for the other compounds.

Potential Risk to Cook Inlet Beluga Whales: Polybrominated flame retardants are considered chemicals of possible concern due to their potential to bioaccumulate, cause endocrine disruption, and other adverse effects.

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Created 5/2011

FACTSHEET: POLYBROMINATED FLAME RETARDANTS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

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Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

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Congeners - chemical compounds that are similar in composition and structure

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

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Created 5/2011

FACTSHEET: CHLORINATED DIBENZO-P-DIOXINS AND FURANS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Chlorinated Dibenzo-p-dioxins and Furans: This class of chemical has no intentional use.

Representative Chemicals: 75 Dioxin (polychlorinated dibenzo dioxins [PCDDs]), 135 furan congeners (polychlorinated dibenzofurans [PCDFs])

Potential Sources: Emitted from waste incinerators and as impurities and by-products from chlorinated bleaching and pentachlorophenol used as a wood preservative for wharf pilings, etc.

Occurrence: No information is available regarding detection in wastewater or runoff, but these chemicals are often introduced by airborne deposition. Low levels of dioxins and furans can be detected worldwide because of airborne dispersion.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: This class of chemicals does not dissolve well in water, but adheres to sediment and bioaccumulates in tissues.

Detection in Animals: This class of chemicals has been detected in the tissues of invertebrates, fish, and marine mammals. In fish and invertebrates, acute toxicity may be low at typical environmental levels, but long-term exposure can result in developmental toxicity. Marine mammals are exposed to these chemicals through the food chain, with possible effects including cancer and suppression of the immune system. Research has shown these chemicals bioaccumulate in marine mammal tissue. Dioxin has been detected at concentrations above thresholds known to affect the immune system in harbor seals from the North Atlantic.

Detection in Beluga Whales: No information is available for Cook Inlet belugas, but these chemicals have been detected in belugas of the St. Lawrence estuary.

Potential Risk to Cook Inlet Beluga Whales: Chlorinated dibenzo-p-dioxins and furans are considered chemicals of probable concern due to their ability to bioaccumulate and the potential for harmful effects on reproduction.

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FACTSHEET: CHLORINATED DIBENZO-P-DIOXINS AND FURANS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Terms and Definitions:

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Congeners - chemical compounds that are similar in composition and structure

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts from short-term exposures to high concentrations of a chemical

Developmental toxicity - any adverse effects resulting from a chemical exposure that would interfere with the reproductive ability of an organism or the development of its offspring, as a result of parental exposure, that can be manifested at any point in the lifespan of the organism.

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FACTSHEET: HYDROCARBONS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Hydrocarbons: This class of chemicals is commonly used in fuels and solvents. Other related terms include oil and grease, with oils generally consisting of liquid petroleum hydrocarbons, and grease tending towards a semisolid appearance.

Representative chemicals: alkanes, alkenes, alkyl benzenes, alkylnapthalenes

Potential Sources: Oil & tar deposits and industrial distillation.

Occurrence: There is no information available on the presence of Non-Polycyclic aromatic hydrocarbons (PAH) in pre-treatment inflowing wastewater entering treatment facilities (PAHs are a subset of hydrocarbon compounds and are discussed in more detail on a separate factsheet). Oil and grease have been detected in post-treatment outflow of wastewater treatment plants, and diesel fuel and gasoline have been found in runoff.

Occurrence in Cook Inlet: Hydrocarbons detected in Cook Inlet include oil and grease and hydrocarbons measured as total aqueous hydrocarbons.

Behavior in the Aquatic Environment: The lighter hydrocarbons (lower molecular weight) are soluble in water (e.g. benzene), while heavier hydrocarbons (higher molecular weight) are less soluble (e.g. dimethylbiphenyl) and may remain suspended or sink to the bottom.[1]

Detection in Animals: No information is readily available.

Detection in Beluga Whales: No hydrocarbons have been reported, with the exception of PAHs. No information is available regarding hydrocarbons in Cook Inlet beluga whales, but they have been detected in the St. Lawrence and Arctic beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Hydrocarbons are considered unlikely chemicals of concern, since there appears to be a low potential for adverse effects. However, due to the lack of available information, the potential risk to Cook Inlet belugas cannot be completely ruled out.

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[1]Gustafson J.B., Griffith Tell J. and Orem, D. 1997. Selection of Representative TPH Fractions Based on Fate and Transport Considerations. In: Total Petroleum Hydrocarbon Criteria Working Group Series. Volume 3. Prepared for the Association of American Railroads, United States Air Force, and the Total Petroleum Hydrocarbon Criteria Working Group. July 1997.

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FACTSHEET: HYDROCARBONS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

FACTSHEET: POLYCYCLIC AROMATIC HYDROCARBONS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Polycyclic Aromatic Hydrocarbons (PAHs): This class of chemicals is naturally occurring and may also be released from industrial products and combustion sources.

Representative Chemicals: Benzo(a)pyrene, anthracene, pyrene

Potential Sources: Asphalt, coal tar, manufactured gas plant residues, and incomplete combustion of coal, oil and gas, or other organic wastes.

Occurrence: There is no information available regarding the presence of PAHs in pre-treatment inflowing wastewater entering treatment facilities. However, aromatic hydrocarbons, as total aromatic hydrocarbons, and benzo(a)pyrene, have been detected in post-treatment outflow of wastewater; and six PAHs, including benzo(a)pyrene have been found in runoff.

Occurrence in Cook Inlet: Aromatic hydrocarbons and PAHs have been detected in samples collected from throughout Cook Inlet.

Behavior in the Aquatic Environment: PAHs adhere to sediment. The lighter, lower molecular weight PAHs (e.g., fluorene) are more water-soluble and less persistent in the environment than the heavier, higher molecular weight PAHs (e.g., benzo(a)pyrene).

Detection in Animals: PAHs occur in the tissues of invertebrates, fish, and bioaccumulate in marine mammals. Acute exposure to lower molecular weight PAHs can cause death in fish and invertebrates in the water column, while chronic exposure to higher molecular weight PAHs, result in reproduction and growth effects in fish and invertebrates. Marine mammals are exposed to these chemicals through their food, the water column, and sediment, leading to possible negative health effects such as cancer, and/or reproductive impacts.

Detection in Beluga Whales: No information is readily available regarding the detection of PAHs in Cook Inlet beluga whales. However, PAHs have been detected in belugas of the St. Lawrence estuary and may be associated with the higher frequency of cancerous tumors found in these animals, compared to other wild populations.

Potential Risk to Cook Inlet Beluga Whales: PAHs are considered chemicals of probable concern due to the documented potential for high molecular weight PAHs to cause cancer and other adverse effects.

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Created 5/2011

FACTSHEET: POLYCYCLIC AROMATIC HYDROCARBONS

Chemical of Probable Concern for Cook Inlet Beluga Whales

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Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute exposure - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposure to a chemical

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Created 5/2011

FACTSHEET: METALS

Chemical of Probable Concern for Cook Inlet Beluga Whales

Metals: This class of chemicals has numerous uses. Mercury is used in dental products, batteries, and antiseptic creams; selenium is used in electronics, glass, pharmaceuticals, and pesticides; cadmium is used in batteries and metal plating; and butyltins are used as anti-fouling agents for boat hulls.

Representative chemicals: Methyl mercury, selenium, butyltins, cadmium

Potential Sources: By-products of crude oils, mining, and industrial products, with some naturally occurring elements.

Occurrence: There is no information available regarding the presence of metals in pre-treatment inflowing wastewater, but the presence of metals in post-treatment outflow indicates a likely presence in inflow. In post-treatment outflow from Cook Inlet wastewater treatment plants, 10-12 metals have been detected, while storm water and/or urban runoff monitoring have detected up to 19 different metals.

Occurrence in Cook Inlet: As naturally-occurring inorganic elements, most metals could likely be detected throughout Cook Inlet, although some might occur at very low concentrations. Studies have focused only on measuring specific metals and the results from the studies differ, detecting between two and nine metals in Cook Inlet.

Behavior in the Aquatic Environment: Many metal compounds dissolve in water; others accumulate in sediment particles, while others, such as methyl mercury and selenium, also bioaccumulate.

Detection in Animals: Metals have been detected in the tissues of invertebrates, fish, and marine mammals. In fish and invertebrates, acute toxicity may be low at environmental levels, but long-term exposure has toxic effects on reproduction, growth, and behavior. Marine mammals are exposed to these chemicals through their food, the water, and sediment. Metals can bioaccumulate in marine mammal tissues, although some marine mammals appear able to control mercury levels in the body. Mercury has been measured in ringed seals and California sea lions, selenium has been found in California sea lions, and Southern sea otters have tested positive for butyltins.

Detection in Beluga Whales: Tissues from Cook Inlet beluga whales were tested for 19 elements and methyl mercury. Levels of mercury, selenium, silver, vanadium and cadmium were lower in Cook Inlet belugas than in other stocks of belugas, copper was higher, and methyl mercury levels in the liver were similar to other stocks. Metals have also been detected in the St. Lawrence, Canadian Arctic, and Greenland stocks of belugas.

Potential Risk to Cook Inlet Beluga Whales: Metals are considered chemicals of probable concern due to their ability to bioaccumulate and the potential for harmful effects on growth and reproduction. High copper concentrations in the liver may also warrant evaluating the possible side effects on kidneys.

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Created 5/2011

FACTSHEET: METALS

Chemical of Probable Concern for Cook Inlet Beluga Whales

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Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

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FACTSHEET: DIAGNOSTIC AGENTS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Diagnostic Agents: This class of chemicals is commonly used in contrast media (dyes) for soft-tissue x-rays.

Representative Chemicals: Amidated and iodinated aromatics

Potential Sources: Industrially manufactured for medical use as contrast media for soft-tissue x-rays.

Occurrence: There is no information available on the presence of diagnostic agents in pre-treatment inflow or post-treatment outflow of wastewater treatment plants, or in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Diagnostic agents are not readily metabolized in the environment.

Detection in Animals: There is no information available regarding the detection of diagnostic agents in aquatic invertebrates or fish tissues, although some toxicity is possible. Toxicity to marine mammals is unknown and dose response information is unavailable.

Detection in Beluga Whales: No information is readily available regarding the detection of diagnostic agents in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Diagnostic agents are considered chemicals of unlikely concern due to their unknown potential for adverse effects on reproduction and the lack of available data measuring chemical concentrations in Cook Inlet.

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FACTSHEET: DIAGNOSTIC AGENTS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

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Metabolized - chemical processes in which a living organism breaks down food for energy or synthesizes the compounds required for the maintenance of life

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FACTSHEET: ENGINEERED PARTICLES

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Engineered Particles (< 100 nanometers [nm] in size): This class of chemicals is commonly used in apparel, electronics, medicine, cosmetics, and sunscreen (titanium dioxide).

Representative Chemicals: Nanotubes and nanoparticles

Potential Sources: Engineered particles are industrially manufactured for use in apparel, electronics, etc.

Occurrence: There is no information available on the presence of engineered particles of <100 nm in pre-treatment inflow or post-treatment outflow of wastewater treatment plants sampled across the United States, or in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Particles may act, grouped together or singly, like solids, liquids, or gases.

Detection in Animals: Detection of engineered particles in aquatic invertebrates and fish tissue is unknown. Toxicity in marine mammals is unknown, but apparently some toxicity occurs at the cellular level in some fish and invertebrates. Dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of engineered particles in any beluga populations. .

Potential Risk to Cook Inlet Beluga Whales: Engineered particles (<100 nm) are considered chemicals of unlikely concern due to their unknown potential for adverse effects and the lack of readily available methods for sampling or analysis.

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FACTSHEET: ENGINEERED PARTICLES

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Dose response - response of an organism when exposed to a chemical

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FACTSHEET: PRIONS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Prions: Prions are biologically-originating infectious agents (somewhat like viruses) with no intentional uses.

Representative Chemicals: Prions are abnormal, infectious forms of protein that lack genetic material and live in the cells of the central nervous system.

Potential Sources: Meat processing, landfill leachate, and medical waste.

Occurrence: The presence of prions in pre-treatment inflow, post-treatment outflow of wastewater treatment plants, or in runoff is unknown, since analytical methods have not been developed to test for prions in the environment.

Occurrence in Cook Inlet: Unknown due to lack of analytical methods.

Behavior in the Aquatic Environment: Prions may attach to treated sludge during wastewater treatment.

Detection in Animals: Prions have been detected in tissues of infected land animals ("Mad Cow Disease" in cattle), but not in aquatic animals. Toxicity to fish, invertebrates, and marine mammals is unknown. Dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of prions in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Prions are considered chemicals of unlikely concern due to their unknown potential for adverse effects on reproductive success and the lack of readily available methods for sampling or analysis.

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FACTSHEET: PRIONS

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Leachate – liquid waste in landfill

Dose response - response of an organism when exposed to a chemical

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FACTSHEET: GLYCOLS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Glycols: This class of chemicals is commonly used in de-icing chemicals and agents.

Representative Chemicals: Ethylene glycol and propylene glycol

Potential Sources: Industrially manufactured for use in de-icing chemicals and agents.

Occurrence: Glycols have been detected in runoff and receiving waters near airports, but no information is available for wastewater treatment plants.

Occurrence in Cook Inlet: No information is available; however, glycols are likely to occur in the vicinity of the Anchorage airport as runoff from de-icing operations.

Behavior in the Aquatic Environment: Glycols are water soluble, but do not persist long in the aquatic environment. Ethylene and propylene glycols exert a high biochemical oxygen demand when they degrade in surface water; this can lead to the depletion of dissolved oxygen in water.

Detection in Animals: Toxicity is low in fish and invertebrates, but may occur on a localized scale at concentrations greater than 8,590 milligram per liters (mg/L). There is no information available on the effects of glycols in marine mammals and the potential for toxicity through prey species is low since glycols do not bioaccumulate.

Detection in Beluga Whales: No information is readily available regarding the detection of glycols in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Glycols are considered unlikely chemicals of concern due to their low potential for adverse effects. However, fish kills and impacts on Cook Inlet beluga whale prey near the airport cannot be discounted.

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Bioaccumulate - the accumulation of contaminants in a living organism over time

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FACTSHEET: PRESCRIPTION & OVER-THE-COUNTER DRUGS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Prescription and Over-the-Counter Drugs: This class of chemicals includes antibiotics, blood-lipid regulators, anti-inflammatory drugs, anti-depressants, and tranquilizers.

Representative Chemicals: Penicillins, tetracycline, clofibric acid, aspirin, ibuprofen, Prozac

Potential Sources: Industrially manufactured, with some limited natural occurrence.

Occurrence: Several antibiotics and pharmaceuticals, up to 22 of each, have been detected in pre-treatment inflow and in post-treatment outflow from wastewater treatment plants. No information is available regarding detection in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Prescription and over-the-counter drugs behave differently, depending on the drug and the biological activity of the environment, in terms of how long they last in the environment, the rate at which they are broken down, and how well they dissolve in water.

Detection in Animals: In a United States Environmental Protection Act study, two antidepressants and one antihistamine were detected in fish fillets and livers. Toxicity to fish and aquatic invertebrates is low with acute exposure, low to high with chronic exposure, and is known to cause endocrine disruption. Toxicity to marine mammals is unknown and information regarding dose response not available.

Detection in Beluga Whales: No information is readily available regarding the detection of prescription drugs in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Prescription and over-the-counter drugs are considered chemicals of possible concern due to the potential adverse effects on reproductive success; although there are no data regarding the environmental concentrations found in Cook Inlet.

Please note: All underlined terms are further defined on the back of this page

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Created 5/2011

FACTSHEET: PRESCRIPTION & OVER-THE-COUNTER DRUGS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Acute exposure - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic exposure - death or severe impacts resulting from long-term exposure to a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response – response of an organism when exposed to a chemical

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FACTSHEET: PHTHALATES/PHTHALATE ESTERS/ALKYLATED PHTHALATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Phthalates/phthalate esters/alkylated phthalates: This class of chemical is commonly used in vinyl softeners in flooring and in adhesives, plastic clothing, toys, and kitchen ware.

Representative Chemicals: Diethyl phthalate and butyl benzyl phthalate

Potential Sources: Industrially manufactured and found in plastic waste.

Occurrence: Though airborne deposition is possible, there is no information available on the presence of phthalates in pre-treatment inflowing wastewater entering treatment facilities. Two to four phthalates have been detected in post-treatment outflow of wastewater treatment plants and up to three phthalates have been detected in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: Phthalates adhere to sediment; the chemical structure of phthalates include carbon chains of varying lengths; those with shorter chains (and lower molecular weights) are more water soluble than those with longer chains (and higher molecular weights).

Detection in Animals: Phthalates have been detected in invertebrates, fish, and marine mammal tissues. Lower molecular weight phthalates show low to moderate toxicity in invertebrates and fish, while higher molecular weight phthalates are not available for toxicity. Phthalates have been observed to bioaccumulate in marine mammals, possible side effects of which would include endocrine disruption; however, some may be metabolized and eliminated from tissues. There is no information available on the dose response to phthalate levels in marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of phthalates in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Phthalates are considered chemicals of possible concern due to their ability to bioacummulate and their potential for endocrine disruption and other adverse effects.

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Created 5/2011

FACTSHEET: PHTHALATES/PHTHALATE ESTERS/ALKYLATED PHTHALATES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Bioaccumulate - the accumulation of contaminants in a living organism over time

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Metabolized - chemical processes in which a living organism breaks down food for energy or synthesizes the compounds required for the maintenance of life

Dose response - response of an organism when exposed to a chemical

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Created 5/2011

FACTSHEET: NATURAL AND SYNTHETIC HORMONES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Natural and Synthetic Hormones: This class of chemical is commonly used medicinally.

Representative Chemicals: Estradiols, thyroxine analogs

Potential Sources: This class of chemical can be naturally occurring or can be industrially manufactured or concentrated.

Occurrence: In pre-treatment inflow, 10 sterols and 15 hormones have been detected and 10 sterols and zero hormones have been detected in post-treatment outflow of wastewater treatment plants sampled across the United States. No information is available regarding detection in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: The behavior in the aquatic environment varies, depending on the hormone and the biological activity in the environment, in terms of how long it lasts in the environment, the rate at which it breaks down, and how well it dissolves in water.

Detection in Animals: There is no information available on detection of natural and synthetic hormones in aquatic invertebrates and fish tissues. There is evidence of low to moderate acute toxicity and low to moderate chronic toxicity in fish and invertebrates, with possible endocrine disruption effects. Toxicity in marine mammals includes possible endocrine disruption effects. Dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of natural and synthetic hormones in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Natural and synthetic hormones are considered chemicals of possible concern due to their potential to cause endocrine disruption and other possible adverse effects.

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Created 5/2011

FACTSHEET: NATURAL AND SYNTHETIC HORMONES

Chemical of Possible Concern for Cook Inlet Beluga Whales

Terms and Definitions:

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Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposure to a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response - response of an organism when exposed to a chemical

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

FACTSHEET: DIETARY SUPPLEMENTS & NUTRACEUTICALS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Dietary Supplements & Nutraceuticals: This class of chemicals is commonly used in bioactive food supplements.

Representative Chemicals: Cholestin, huperzin, kava, and other herbal products

Potential Sources: Industrially manufactured and/or concentrated, as well as natural occurrence.

Occurrence: There is no information available on the presence of dietary supplements and nutraceuticals in pre-treatment inflow or post-treatment outflow of wastewater treatment plants, or in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: The behavior of dietary supplements and nutraceuticals vary, depending on the supplement and the biological activity in the environment, in terms of how long it lasts in the environment, the rate at which it breaks down, and how well it dissolves in water.

Detection in Animals: There is no information available regarding detection in aquatic invertebrates or fish tissues, although some toxicity is possible. Toxicity to marine mammals is unknown and dose response information is unavailable.

Detection in Beluga Whales: No information is readily available regarding the detection of dietary supplements and nutraceuticals in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Dietary supplements and nutraceuticals are considered chemicals of unlikely concern due to their unknown potential for adverse effects on reproduction. In addition, there are no data on environmental concentrations in Cook Inlet.

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FACTSHEET: DIETARY SUPPLEMENTS & NUTRACEUTICALS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

Please note: The terms probable, possible, and unlikely do not refer to the likelihood of adverse effects on the Cook Inlet beluga whale population but to whether there is sufficient reason to evaluate them further. A probable chemical of concern does not automatically mean that it is causing adverse effects to belugas in Cook Inlet; it means only that there is probable cause to evaluate it further.

Dose response - response of an organism when exposed to a chemical

This factsheet is an excerpt from a report, "Chemical exposures for Cook Inlet beluga whales: a literature review and evaluation", which can be found online at: http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/reports/cibtoxicology0310.pdf. This document was produced by toxicologists and environmental scientists with URS Corp. for NOAA Fisheries, National Marine Fisheries Service, under NMFS contract no. AB133F-06-BU-0058. The report was intended to help inform NMFS in their efforts to conserve and promote the recovery of Cook Inlet beluga whales. The presentation of information and recommendations for additional toxicological investigations represent the professional judgments of the URS authors alone. The report is advisory in nature and does not require NMFS to take any action based on its recommendations.

FACTSHEET: FRAGRANCES, SUNSCREENS, COSMETICS, SOAPS, CONDITIONERS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Fragrances, Sunscreens, Cosmetics, Soaps, Conditioners: This class of chemicals is commonly used in sunscreen agents and personal care products.

Representative Chemicals: Methylbenzylidene camphor, oxybenzone

Potential Sources: This class of chemicals is industrially manufactured for use in personal care products.

Occurrence: There is no information available on the presence of fragrances, sunscreens, cosmetics, soaps, or conditioners in pre-treatment inflow or post-treatment outflow of wastewater treatment plants, or in runoff.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: The above mentioned personal care products behave differently depending on the chemical composition and the biological activity in the environment; these factors will determine how long it lasts in the environment, the rate at which it breaks down, and how well it dissolves in water.

Detection in Animals: There is little information available regarding the detection of personal care products in aquatic invertebrates and fish tissues. Two synthetic musk fragrances (glaxolide and tonalide) were detected in fish tissue in a United States Environmental Protection Agency project, with evidence of low acute and chronic toxicity. Toxicity to marine mammals is unknown and dose response information for marine mammals is unavailable.

Detection in Beluga Whales: No information is readily available regarding the detection of fragrances, sunscreens, cosmetics, soaps and conditioners in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Fragrances, sunscreens, cosmetics, soaps, and conditioners are considered chemicals of unlikely concern due to their unknown potential for adverse effects on reproduction. In addition, there are no data on environmental concentrations in Cook Inlet.

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Created 5/2011

FACTSHEET: FRAGRANCES, SUNSCREENS, COSMETICS, SOAPS, CONDITIONERS

Chemical of Unlikely Concern for Cook Inlet Beluga Whales

Terms and Definitions:

Chemicals of **probable, possible, or unlikely concern** were designated based on the need for further evaluation for potential adverse effects on Cook Inlet beluga whales.

Chemicals of probable concern - Chemicals were designated as chemicals of probable concern if they were reported in the environmental media of Cook Inlet and/or in Cook Inlet beluga whale tissues and if they are known to be associated with adverse effects on reproduction or growth in marine mammals.

Chemicals of possible concern - Chemicals were designated as chemicals of possible concern if they are known to or are suggested to be associated with adverse effects on growth or reproduction in marine mammals or they are known to be toxic to beluga whale dietary items (fish and invertebrates), but if there was insufficient data as to the presence of these chemicals in Cook Inlet media and in beluga whales.

Chemicals of unlikely concern - Chemicals were designated as chemicals of unlikely concern if they are associated with low toxicity to marine mammals and aquatic biota, chemicals whose toxicity is unknown but whose environmental concentrations appear to be at extremely low levels and chemicals for which the scientific literature does not appear to support their potential for toxicity to beluga whales.

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Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposure to a chemical

Dose response - response of an organism when exposed to a chemical

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Created 5/2011

FACTSHEET: CONSUMER PLASTICS

Chemical of Possible Concern for Cook Inlet Beluga Whales

Consumer Plastics: This class of chemicals is commonly used in CDs, DVDs, eyeglass lenses, and water bottles.

Representative Chemicals: Bisphenol A (BPA; 2,2-bis [4-hydroxydiphenyl] propane)

Potential Sources: Industrially manufactured as an intermediate for epoxy resins and polycarbonate plastics.

Occurrence: This class of chemical has not been detected in pre-treatment inflow or post-treatment outflow of wastewater treatment plants sampled across the United States. No information is available regarding detection in runoff, though airborne deposition is possible.

Occurrence in Cook Inlet: No information is readily available.

Behavior in the Aquatic Environment: These types of chemicals do not mix well with water, they adhere to organic materials, they break down biologically, and have a low potential to bioaccumulate.

Detection in Animals: Consumer plastics have been detected in aquatic invertebrates and fish tissues and there is evidence of low to moderate acute toxicity and low to moderate chronic toxicity in fish and invertebrates. Toxicity includes possible endocrine disruption effects in both snails and marine mammals. Dose response information is unavailable for marine mammals.

Detection in Beluga Whales: No information is readily available regarding the detection of consumer plastics in any beluga populations.

Potential Risk to Cook Inlet Beluga Whales: Consumer plastics are considered chemicals of possible concern due to their potential to cause endocrine disruption and other possible adverse effects.

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Bioaccumulate - the accumulation of contaminants in a living organism over time

Acute toxicity - death or severe impacts resulting from short-term exposure to high concentrations of a chemical

Chronic toxicity - death or severe impacts resulting from long-term exposure to a chemical

Endocrine disruption - interference with the functions of hormones due to chemical exposure

Dose response - response of an organism when exposed to a chemical

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