

SLIDE	Narration – Fate human health and non-target Wood Preservatives Data Requirements
Slide 1	Welcome to the training presentation series on 40 CFR part 158W. This is the presentation on data requirements for wood preservative uses, including fate, human health, and ecological data requirements.
Slide 2	<p>There are two key elements of this presentation. First, there is a general wood preservatives overview and second we will discuss data requirements for assessing potential exposures and risks. The general information about wood preservatives and emission scenarios for estimating wood preservatives in the environment are based on the Organization for Economic Cooperation and Development’s Emission Scenario Document for Wood Preservatives (2013). The general wood preservative overview includes a discussion of the wood preservative life cycle, treatment processes, types of pressure treatments, and retention level in wood. The data requirements discussion is organized by general categories, including environmental fate and exposure and toxicity and exposure to humans, plants and animals. The last part of this presentation will discuss the calculations and models EPA employs to assess risk and exposure.</p> <p>Use Site Index category 10, wood preservatives, includes both pressure and non-pressure treated wood.</p> <p>The pressure treatment of wood is a step in the production of a range of wood products such as rail road ties and cross-arms, utility poles, plywood, dimensional lumber, decking, etc.</p> <p>Non-pressure treated wood includes wood which has undergone anti-sapstain treatment for uses such as mill work and de-barked trees as well as the remedial treatment of utility poles with pole wraps at the base of the pole and injections into drilled holes to control rot.</p>
Slide 3	<p>AD assessments of wood preservatives primarily considers two stages in the wood preservative life cycle: product application and treated wood in service. The first stage, the product application, includes wood preservative treatment, storage of treated wood prior to shipment and preventive or curative treatments performed in situ by professionals and amateurs. Information on emissions estimation for professional and amateur in situ treatments are discussed in section 4.2 of the OECD ESD (Emission Scenario Document). Section 4.1 of the OECD ESD discusses emission estimation for industrial preventive wood treatment processes. Tables 4.1, 4.4 and 4.7 of this document present information on down-the-drain emission pathways for wood treatment by automated spraying (Table 4.1), dipping or immersion (Table 4.4), and vacuum pressure and double vacuum or low pressure processes (Table 4.7).</p> <p>Stage two, treated wood in service, will be discussed later.</p>
Slide 4	<p>There are two basic types of wood preservative treatment processes:</p> <ol style="list-style-type: none"> <li>1. <b>Pressure Treatment-</b> A penetrating application process which includes features or procedures intended to overcome the natural resistance of wood to</li> </ol>

	<p>penetration by a wood preservative. An example of pressure treatment would be vacuum pressure impregnation.</p> <p>2. <b>Non-Pressure Treatment.</b> The wood preservative is applied via a superficial application process, such as immersion or dipping, brushing, or spraying. This method is used for sapstain and mold control and for remedial or in situ treatment of wood in service.</p>
Slide 5	<p>The wood preservatives general use pattern, which is category 10 of the Use Site Index, includes both pressure and non-pressure wood preservative treatments.</p> <p>Pressure treated wood products include rail road ties and cross-arms, utility poles, plywood, dimensional lumber, etc.</p> <p>Non pressure-treated wood products include mill work and de-barked trees—typically as an anti-sapstain treatment. It also includes the remedial treatment of utility poles with poles wraps at the base of the pole and injections into drilled holes to control rot.</p>
Slide 6	<p>There are three types of wood preservatives available for pressure treatment:</p> <p><b>Water-borne</b> wood preservatives, such as CCA, which is used on industrial and commercial building structures.</p> <p><b>Creosote</b> which is mainly used for treating railroad ties and marine structures</p> <p><b>Oil-borne</b> preservatives, such as pentachlorophenol (PCP), which is used for treatment of utility poles and cross arms.</p> <p>For antisapstain treatment, the products are all water-based.</p>
Slide 7	<p>Retention level is the amount of wood preservative which remains in wood at the end of the treatment process.</p> <p>Retention level of the preservative in wood is measured in pounds of chemical per cubic foot (pcf) of wood. This information is necessary for estimating the amount of the wood preservative which leaches out of the wood over time.</p> <p>Retention levels vary by chemical and the way a treated wood product is used. Generally, the harsher the environmental conditions that treated wood is expected to endure in service, the higher the desired retention level.</p>
Slide 8	<p>This slides shows the formation of sapstain in the trunk of a tree not treated with a wood preservative.</p>
Slide 9	<p>This slides shows anti-sap stain application on a deck.</p>
Slide 10	<p>This slide shows the application of wood preservative to a pole.</p>
Slide 11	<p>These images show how wood is pressure treated. Wood is put in cylinders along with the chemical. The cylinder is sealed off and the wood preservative is forced into the wood by increasing the pressure in the chamber. After treatment, treated wood is kept</p>

	on pads in the treatment facility to dry and any residual chemical is collected and returned to the treatment cylinder.
Slide 12	This concludes the general overview of wood preservatives. Now we will discuss environmental fate data requirements under 158W.
Slide 13	<p>The following 2 slides show the data requirements for wood preservatives based on 40 CFR Part 158 Subpart W.</p> <p>R indicates required data for each use.</p> <p>CR indicates conditionally required data, which may or may not be required. Triggers in the test notes for each study indicate the circumstances under which the Agency has learned through experience that the information is needed.</p> <p>The new data requirements are for toxicity and fate in wastewater systems. The activated sludge respiration inhibition test (850.3300) is required of chemicals with a wood preservative use pattern. Wastewater treatment plant fate data are conditionally required depending on the end-use and physical or chemical properties of the wood preservative.</p> <p>The results of the ASRI, or activated sludge respiration inhibition, test are used to determine what type of WWTP (wastewater treatment plant) biodegradation test should be required. The last four tests on this table are used to determine potential for biodegradation during wastewater treatment; the last three of these are biodegradation simulation tests. If the results from the ASRI test show an EC<sub>50</sub> less than or equal to 20 mg/L, one of the three biodegradation simulations tests (i.e., the last three tests listed on this table) may be required. If the result of the ASRI test is an EC<sub>50</sub> greater than 20 mg/L, then a ready biodegradability test can be conducted. If the wood preservative fails the ready biodegradability test, however, one of the three simulation tests would still be required.</p> <p>In the absence of wastewater treatment plant (WWTP) fate tests, the Agency would assume that no removal of the wood preservative occurs during wastewater treatment.</p>
Slide 14	<p>The monitoring of representative US waters is conditionally required based on the exact use of the treated wood.</p> <p>The special leaching non-guideline study is a required study and will be used for modeling the fate of the wood preservative in the environment. If leaching data are not available, 100% leaching from wood will be assumed when assessing potential exposures and risks.</p>
Slide 15	As we have said, there are many different uses for wood preservatives. Let's discuss how the Agency uses data on a wood preservative's unique chemical properties and its specific labeled uses to assess emissions and fate.
Slide 16	These are the emission scenarios which are used for estimating the environmental concentrations of the wood preservative. If there is more than one scenario, depending

	<p>on the use conditions, either the scenario with the greatest environmental impact will be used or in some specific conditions the cumulative data from different scenarios will be used to estimate the environmental concentrations.</p> <p>Some of these scenarios are similar to those used by OECD (The Organization for Economic Cooperation and Development). The major difference is that the input data, such as dimensions of the structures, are adjusted to the environmental conditions in the United States. All available data will be considered when these scenarios are developed.</p>
Slide 17	<p>These are structures which are considered in emissions scenario development. From top left to the right, a house, fence, pilings, fence post, utility pole and a dock in a water body.</p>
Slide 18	<p>In this schematic, the dimensions of the house would be used for calculating surface areas for input into the Agency's model.</p>
Slide 19	<p>This table shows input data requirements as well as output calculations which will be used to estimate the concentrations of wood preservatives in the environment. This table also shows symbols, values and units used for input data requirements and the output results. Some values are suggested for use in calculations. Based on the use, updated available data will be used as inputs to the model.</p>
Slide 20	<p>The receiving body of water is either a "standard farm pond" or "small lake."</p> <p>The standard farm pond has 20 million liters of water. The estimated environmental concentrations (EECs) from the farm pond are used as exposure estimates for non-target aquatic plant and animal risks.</p> <p>The small lake is called an "Index Reservoir" which contains approximately 146 million liters of water. The estimated environmental concentrations (EECs) from the Index Reservoir are used as exposure estimates for human dietary risks from drinking water.</p>
Slide 21	<p>Next we'll discuss how the Agency assesses risk and exposure to humans. Under 158W, human exposure data—either occupational or residential—is not always required.</p>
Slide 22	<p>When are Occupational and/or Residential Exposure data required? 158W states that data are required if the chemical and use of concern suggest both toxicity <u>and</u> the potential for exposure.</p> <p>For those wondering what "changes" in data requirements for human health for wood uses resulted from the issuance of 158W – well actually, only one. Mostly, the data requirements issued during the Reregistration Eligibility Decisions or "REDs" are the same data requirements codified in 158W. The only new data requirement in 158W is for an Immunotoxicity study.</p>
Slide 23	<p>EPA uses data from required studies to calculate the margin of exposure, or the "exposure" people face when using the pesticide. These are the same data requirements for wood treatment uses prior to 158W (and now codified in 158W).</p>

	<p>For wood treatment, “worker” or “applicator” data are needed to determine how much chemical contacts the skin or is in the air the worker breathes while treating wood.</p> <p>The data highlighted in this slide are required for both pressure treatment (PT) and anti-sapstain labeled uses. Dermal exposure is collected by analyzing whole body dosimeters, basically long-john underwear worn beneath regular work clothes, as well as hand washes. Inhalation exposure is measured with personal air samplers worn by the workers and study participants.</p> <p>Other types of wood treatments, such as remedial treatments, have minimal contact; for example, impregnated wraps with workers wearing gloves; pole injection workers wearing gloves, injecting treatment, and capping the drilled hole.</p>
Slide 24	<p>In addition to the worker exposure at treatment facilities, there is the potential contact with the treated lumber. These are the same studies required prior to 158W.</p> <p>For pressure treatment of dimensional lumber, EPA assesses children contacting play sets and decks. The routes of exposure include dermal contact as well as incidental oral ingestion which results from a child’s hand-to-mouth activities.</p> <p>For anti-sapstain treatment, such as mill work, EPA assumes minimal contact with window/door frames, etc. and does not quantify these exposures.</p> <p>In other types of treatments such as remedial pole treatments the wraps are buried and injections are capped so EPA assumes minimal contact; no quantitative assessment.</p>
Slide 25	<p>At this time, EPA is not requiring data nor assessing dietary exposures from treated wood.</p> <p>It is assumed that there is minimal intermittent contact from wood potentially used in the construction of picnic tables, flat beds of farm trucks, and raised garden beds.</p>
Slide 26	<p>Long-term exposure, defined as daily exposure for greater than 6 months, is assumed for both workers at pressure treatment and anti-sapstain facilities as well as residential post-application to playsets and decks.</p> <p>In subsequent slides, the toxicity tables from 158W specify each of the toxicity studies required.</p>
Slide 27	<p>Tier 2 toxicity data are triggered for food uses and also for uses that may result in chronic exposures such as: uses of chemicals in swimming pools, aquatic areas, wood preservative treatments, and metal working.</p> <p>As a reminder, EPA considers short-term duration as 1-30 days continuous or daily exposure, intermediate-term as 1-6 months continuous or daily exposure, and long-term exposure as occurring daily for greater than 6 months.</p>
Slide 28	<p>This table is provided to illustrate the specific study requirements for wood treatments, for example, 90-day oral, 90-day inhalation, etc.</p>

	The Test Notes cited in the last column of this table can be viewed in 158W.
Slide 29	Also note that studies specify the formulation of the test substance that should be used. For example, the test may specify TGAi for technical grade active ingredient or PAI for pure active ingredient. Refer to 158W to see test substance formulation requirements for each study.
Slide 30	<p>The risk assessments supporting the reregistration eligibility decision or RED for the three heavy-duty wood preservatives – CCA, Pentachlorophenol and Creosote indicated the need to reduce worker exposure at treatment facilities. REDs issued by EPA for the heavy duty wood preservatives required the installation of engineering controls to reduce worker exposure and thus mitigate risk.</p> <p>For the non-heavy duty wood preservatives, we may lack exposure data. In the absence of worker exposure data the Agency will use two surrogate studies—one for pressure treated wood and one for antisapstain, non-pressure treated wood. The Antimicrobial Exposure Assessment Task Force, AEATF, has conducted and submitted a pressure treatment study for use as “surrogate” for dermal and inhalation worker exposures. Likewise, the Sapstain Industry Group, SIG, submitted studies for worker exposure too. Without chemical-specific exposure data, EPA plans to use these generic exposure studies in our risk assessments.</p> <p>The default transferable residue of 1 ug/cm<sup>2</sup> from wood surfaces is based on what EPA has seen in various studies. Although it is viewed as a high-end estimate, it is not a gross-overestimate, unless there is a unique chemical that more tightly binds to wood – and a chemical-specific study may refine this estimate, if warranted.</p>
Slide 31	The Consumer Product Safety Commission proposed a protocol for a wipe sampling study to assess transferrable residues from pressure treated wood surfaces. EPA recommends that registrants use the CPSC study and contact EPA with any questions on the protocol.
Slide 32	Now we’ll explain how we use the human health data.
Slide 33	<p>When exposure and toxicity inputs are quantified, the basic risk equation is expressed as the Margin of Exposure, commonly known as the “MOE”. EPA uses this MOE approach to determine if chemicals can be registered and/or if the exposures resulting from the uses associated with the chemical need to be reduced or “mitigated”.</p> <p>Toxicological endpoints are selected from a battery of the 158W toxicity studies. Once the appropriate endpoint is selected, the point of departure or “POD”, for example, the NOAEL or LOAEL, is compared to the potential human exposure from a given use, for example, worker exposure during pressure treatment of wood) This ratio of tox-to-exposure is what we refer to as the “MOE”, previously called margin of safety.</p> <p>The higher the MOE ratio, the less risky the exposure is (you want the human exposure to be less than the toxicity POD). For example, if the no effect level is 100 mg/kg/day in an animal study and the human exposure is estimated to be 1 mg/kg/day, then the MOE ratio is 100/1 or 100. The estimated MOE is compared to the “Target MOE” to</p>

	<p>determine if exposure needs to be mitigated. The Target MOE is based on a series of uncertainty factors. Typical uncertainty factors (UFs) are 10x for interspecies extrapolation from rats to humans and another 10x for intra species variation to account for the fact that some people are more sensitive than others. In this example, the target MOE is 100 (10x10). Other UFs are used to account for missing data for extrapolation from a short- to long-term exposure duration.</p> <p>Different equations are used for cancer assessments.</p>
Slide 34	<p>For ecological risk assessments the non-target organism data requirements for wood preservatives are similar to the other use patterns of antimicrobial pesticides except for the requirement of an acute contact honeybee study. The following slides will go over the specific ecological data requirements for these chemicals.</p>
Slide 35	<p>These four non-target organism studies are required for all antimicrobial pesticide products. Wood preservatives are no exception. The studies are used to determine a baseline toxicity level and can be used for labelling purposes. If the chemical is toxic to fish based on the acute study, then a statement would added to the label stating that the chemical is toxic to fish and to take proper steps to reduce any exposure of the chemicals to aquatic environments.</p>
Slide 36	<p>Two chronic studies are required for the wood preservative chemicals. These are used in the risk assessment process to determine any chronic toxicity to fish and aquatic invertebrates. The results of these studies can be used to determine if exposure to these chemicals can lead to the likelihood of adverse ecological effects in non-target fish and invertebrates.</p>
Slide 37	<p>Wood preservatives are sometimes used to treat wood that will be used in aquatic environments. These could be walls, decks, poles, stilts for houses, walkways, and other building uses in or near aquatic areas. Since potential exposure to aquatic organisms is expected for these chemicals, two aquatic plant studies are required:</p> <ol style="list-style-type: none"> <li>1. An aquatic vascular plant study determining the effect on plant growth; and</li> <li>2. An algal study determining the effect on growth using <i>S. capricornutum</i>, a green algae.</li> </ol> <p>If the algae test results indicate toxicity, then additional testing will be required using the four species listed on this slide.</p>
Slide 38	<p>Since honeybees could come into contact with treated wood, a honeybee acute contact test is required. As everyone should be aware, the decline of honeybees is a serious problem and has become a priority for EPA. The results from this test will help to ensure that wood preservative chemicals are not contributing to this problem.</p> <p>However, a toxicity of residues to honeybees study is not required due to the lack of potential exposure to bee larvae.</p>

Slide 39	Finally, let's discuss how we use non-target organism data
Slide 40	Leaching studies are required for the wood preservatives in order to determine if any exposure occurs to non-target organisms. Toxicity values are obtained from the results of the previously mentioned non-target organism studies. Only the most sensitive endpoints are used to determine the Risk Quotients, referred to as "RQ's". These RQs are calculated by dividing the exposure estimates by the toxicity values. Then the RQs are compared to Levels of Concern, which are criteria used by the Agency to indicate potential risk to non-target organisms. If the LOCs are exceeded, then a risk is indicated and regulatory action could be necessary.
Slide 41	For more information, see these references.