June 10, 2015

By Overnight Delivery & Electronic Mail

Mr. Greg Schweer, Chief  
New Chemicals Notice Management Branch  
Office of Pollution Prevention and Toxics  
Environmental Protection Agency  
Room 4133-A; (MC: 7405M)  
1200 Pennsylvania Avenue, N.W.  
Washington, D.C. 20460

Dear Mr. Schweer:

The Independent Lubricant Manufacturers Association ("ILMA" or the "Association") offers these comments on the Environmental Protection Agency’s ("EPA" or the "Agency") pending review of the Pre-Manufacture Notices ("PMNs") for medium-chain chlorinated alkanes ("MCCAs") (C_{14}-C_{17}) and long-chain chlorinated alkanes ("LCCAs") (C_{18}-C_{20}). These comments are intended to supplement the matters discussed during the June 3, 2015 meeting between the Agency and ILMA. The Association’s members and representatives who attended last week’s meeting appreciate the time you and the other EPA staff gave to us.

ILMA and its Members’ Products

ILMA is a national trade association of 317 member companies. As a group, ILMA’s manufacturing members blend, compound, and sell over 30 percent of lubricants, and over 75 percent of the metalworking fluids ("MWFs") utilized in the United States. MWFs include products for grinding and machining of metals, known as “metal removal fluids,” and for drawing, forming and stamping of metal parts, known as “forming fluids.” Metal removal fluids and forming fluids both can be further described as either “straight oil” products or “water dilutable” fluids. Straight oils are petroleum based and are not intended to be further diluted with water. Water dilutable fluids may be further described as “emulsifiable oils,” “soluble oils,” “semi-synthetics” and “ synthetics.” Soluble oils and semi-synthetics contain some petroleum oils, while synthetics are petroleum oil-free.

ILMA members manufacture lubricant mixtures by compounding and blending components, such as lubricant base stocks and additives, including MCCAs and LCCAs. ILMA members have extensive experience with these substances and their use in MWFs.
While not direct parties to the PMN review process under Section 5 of the Toxic Substances Control Act ("TSCA"), ILMA members have been supplied MCCA and LCCA products from the PMN submitters for decades and are directly impacted by any decision EPA makes on these substances. ILMA members’ extensive experience in formulating MWFs, including those containing MCCAs and LCCAs, enables the Association to offer relevant comments to EPA on the use, handling and disposal of these substances in MWFs. ILMA members would be significantly and adversely affected if the Agency rejects the referenced PMNs.

Issues Exist with Alternative Chemistries to MCCAs and LCCAs

As an initial matter, ILMA needs to reiterate two items. First, notwithstanding the regulatory path under TSCA Section 5, chlorinated alkanes, including MCCAs and LCCAs, have been in U.S. commerce for decades (over 50+ years). Over this extended period of time, ILMA members have formulated chlorinated alkanes as high-quality, cost-effective “extreme-pressure” additives into MWFs used by their customers to cut and shape metals.\(^1\) ILMA believes that its members and their customers responsibly use MCCAs and LCCAs in MWFs.

Second, ILMA has never said or suggested that alternatives to MCCAs and LCCAs do not exist. However where viable replacements have not been found, there are a number of reasons to explain the continued reliance on MCCAs and LCCAs in MWFs. Such reasons include worker exposure hazards presented by the alternatives, tool efficiency, impact on parts, metallurgy, quality or yield, certification or approvals, cost, and environmental concerns regarding alternatives.

While diligent efforts have and continue to be made to remove chlorine from MWFs and reformulate these products, where possible, there is a limited universe of elements and combined chemistries that can be utilized functionally as extreme-pressure additives in MWFs. ILMA members indicate the following as typically-viewed alternatives to chlorinated alkanes as extreme-pressure additives in MWFs: chlorinated fatty esters and acid, sulfonated hydrocarbons, phosphate acid esters, phosphorus-containing blends, boundary ester lubricants, complex esters, hydrogen phosphate, and nitrogen-containing compounds. ILMA members further report that these alternative chemistries become very application specific.

Two available reference materials describe the essential role that MCCAs and LCCAs play as extreme pressure ("E.P.") additives in MWFs. First, Schey\(^2\), in his classic review of tribology in metalworking, notes:

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\text{E.P. additives are mandatory when boundary additives would be totally ineffective (as on stainless steel and other high-chromium steels, and on titanium) or would break down at the higher temperatures developed in the process (as in the more}
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\(^1\) As noted in the June 3 meeting, MCCAs largely replaced short-chain chlorinated alkanes (“SCCAs”) (C\(_{10}\)-C\(_{13}\)) after two of the PMN submitters agreed by consent order to stop selling SCCAs.

Severe working of steels. The choice of additives depends on, among other factors, workpiece material. Thus chlorine is the only effective element for stainless steel. Sulfur is effective on steel, but is avoided on high-nickel alloys because of the danger of forming a low-melting eutectic, and on copper alloys because of the formation of a dark sulfide stain. Staining is proportional to the activity of the additive; additives that are nonstaining at room temperature can be effective at the high temperatures that prevail in metalworking. A nonactive additive does not react with copper below 100°C. Phosphorous, usually in the form of phosphate esters or ZDTP, is effective more as an antiwear agent.

Second, Childers\(^3\) writes:

> Extreme-pressure additives, such as sulfur, chlorine and phosphorous actually form metal complexes with the metal surface at elevated temperatures. Chlorinated additives are the most effective with typically 40 to 70% chlorine in the additive compared with sulfurized additives with 10 to 15% sulfur, or phosphate esters with 5 to 15% phosphorous. Each has its problems. Chlorinated additives, in general, are under scrutiny owing to concerns about health hazards. Sulfurized materials can stain metals and quickly cause rancidity. Phosphate esters, the least effective of the three as a lubricant, can cause fungus and mold growth because phosphorous is such a good nutrient… For more difficult machining operations, extreme-pressure additives, such as sulfurized, chlorinated, or phosphated additives are added to the mineral oil. These additives are surface reactive and form metallic reaction product films on the tool surface, thereby acting much like a solid lubricant at the metal-tool interface.

These two extensive quotations reflect the difficulty to quickly replace MCCAs and LCCAs in those remaining applications judged by ILMA's members to be critical. Further complicating the situation, the Agency, on account of perceived risks of formaldehyde, is contemplating limiting the use dilutions of the metalworking antimicrobial 1,3,5-tris-(2-hydroxyethyl)-s-triazine (CAS number 4714-04-4) to 500 ppm, significantly lower than currently permitted use dilutions of between 1000 and 1500 ppm. Such a restriction would effectively eliminate the most widely used biocide the industry has available, exacerbating formulators’ attempts to substitute a phosphate ester or other phosphorous compound for an MCCA or LCCA in a water-dilutable product.

Even if a new phosphate ester additive were found to work, either alone or in combination with other chlorine-free additives, any new additives which result from the intentional formation of a reaction product between a phosphate ester and an alkanolamine to form a chemical salt will require TSCA registration as a new substance, further adding to the time required to ready alternatives to MCCAs and LCCAs in critical applications.

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ILMA would like to build on the previous paragraphs, noting particularly the hurdles faced by its members and their customers in trying to reformulate away from MWFs that contain MCCAs or LCCAs. It is necessary to establish equivalent or better performance for the new MWF compared to the current lubricant. Such performance is based on trials on multiple alloys and sizes, and the finished product or part must meet all specifications and must be accepted by the customer. For example, the following factors are taken into account when selecting a tube-forming compound:

- Rate of deformation (percentage of cross-section reduction);
- Drawing speeds/tube reducing feeds/speeds;
- Tool life;
- Tube quality (out diameter (“OD”)/inner diameter (“ID”) surface);
- Post draw cleaning (compatibility with degreasing system);
- Metallurgical damage due to residual elements post annealing;
- Compatibility with mechanical systems (pumps, filters, seals and tanks); and,
- Economics.

Frankly, each of the above factors can be subdivided into dozens of parts and can require numerous iterations. Further, finished products must meet or exceed current acceptable product yield after final testing with no significant rework. In many instances, the final product has to go through recertification or re-approval processes, often done by third parties, including governmental organizations. Obviously, this work represents a tremendous resource drain from operations and increases manufacturing costs.

Additionally, there are practical limitations on the use of alternative, chlorine-free chemistries as extreme-pressure additives in MWFs. As noted above, sulfur and phosphorus-based substitutes are commonly mentioned. However, sulfur-based chemistries cannot be used in any process involving aluminum because the sulfur will stain the finished aluminum. Further, using sulfur-based alternatives in the fabrication of stainless steel tubes must be done with extreme care because if any of the sulfur-based compounds remains on the finished product that is subsequently heat treated (i.e., annealed), then the residual sulfur-based materials can cause inner granular corrosion at the grain boundary, and this will lead to perforation of the finished, in-service tubes.

**Critical Uses of MCCAs and LCCAs**

As mentioned during the June 3 meeting, and including the above, a threshold concern for ILMA is the appropriate definition of “critical use.” ILMA believes “critical use” encompasses a specific use for which the lack of alternatives acceptable to the customer would result in a significant market disruption, as well as where there are no technically or economically feasible alternatives or substitutes available to the user from the standpoint of environment and human health. The mere fact that alternative, chlorine-free chemistries may exist should not be the sole or limiting factor to determine whether a particular use is critical.

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3Similar lists exist for virtually every application.
ILMA has been diligently asking its members to identify critical uses of MCCAs and LCCAs in MWFs. However, as we mentioned in the June 3 meeting, the collection of relevant information has been challenging, largely because customers’ confidential business information (“CBI”) is involved. In addition, for military applications, Department of Defense (“DoD”) policies generally preclude the possibility of providing test data and/or further documentation to substantiate critical use claims. As one ILMA member offered, “Reports are written for each [DoD-related] test, and we review them in post-production meetings, but we are not allowed to take any documentation with us.” This is just one comment, but it is indicative of many responses ILMA received from its members about DoD-related procurement of products and parts manufactured from MWFs containing MCCAs or LCCAs. ILMA remains eager to assist EPA in collecting data, but CBI claims and DoD policies remain as obstacles.

ILMA did share some anecdotal additional information during the June 3 meeting about certain uses its members deem critical:

As we’ve discussed in the past, the one application where we’ve been unsuccessful replacing chlorinated paraffins is at [*****] primarily in its [*****, **], but they use similar products in their other plants. They use Formax machines from National that pump out millions of brass cartridges for all types of ammunition and the only thing they’ve found to work is our [******] at 10% to 15% concentration in water. [*******] is a heavy-duty soluble oil with a base oil viscosity of around 2000 SUS and 20.8% elemental chlorine. We’ve been supplying them this product for over five years and before us it was a [******] product with the same chlorine content. Since ‘day one’ they’ve been trying to get away from the chlorine because these Formax machines are not well sealed and the chlorine gets into their gearboxes and corrodes their gears. We’ve tried four different phosphorus esters, colloidal calcium carbonate, overbased calcium carbonate, boramides, various zinc chemistries, blown esters, polybutenes, anything and everything but nothing will make the parts like chlorine. They have tried any and all comers. It seems that everyone is free to submit samples if they feel it stands half a chance. No luck. The [******] will run for weeks and produce millions of parts, but best a non-chlorinated product has done is the colloidal calcium product which ran sporadically for three days and produced less than 300,000 parts.

In another evaluation of alternatives to chlorinated alkanes, an ILMA member formulated a vegetable oil and sulfur blend to be used in titanium bolt grinding. This alternative failed because of inadequate grinding wheel life. A vegetable oil and zinc phosphate-containing fluid is being used successfully in Germany on new machines to manufacture titanium bolts. It should be noted that the zinc additive used in the German fluid is very aggressive to the human skin, and the U.S. division of the company using the product in Germany is precluded by company policy from using it in its U.S. grinders. The aggressive nature of the fluid may be somewhat mitigated in Germany because the grinding machines there are typically five years old and, thus, have sophisticated, integrated

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5Vegetable-based fluids typically have a much shorter lifetime and usually are not included in most “used oil” recycling programs.
environmental controls. By comparison, 100% of the grinding machines used by the aerospace fastener manufacturers in Southern California average about 40 years in age, and have no integrated environmental controls. It should be further noted that the U.S. division of the company that makes the fluid used in Germany advises on its website against its use for grinding. Finally, as discussed below, the best practice is to perform in-house recycling and re-use of grinding fluids.

ILMA has learned that the existing straight-oil MWFs for titanium grinding in the Southern California area typically are formulated with an MCCA (C_{14}–C_{17}) containing 50 to 55% chlorine. Formulating an alternative, even with vLCCAs, for use in Southern California will be a challenge. Because of the higher carbon chain length, viscosity of the substitute vLCCA is also very high, adversely affecting the ability of the fluid to settle swarf, a by-product of the metal grinding process. (Suspended swarf can lead to machine tool operator dermatitis.) Further, to develop a formulation with a vLCCA, a formulator would be required to use a very low viscosity oil, such as a “mineral seal” oil, increasing the risk of fires. However, restrictions on emissions by the South Coast Air Quality Management District under its Rule 1144 prohibit use of such low viscosity oils in metalworking applications. As a result, even use of vLCCAs in such straight oil, titanium grinding formulations is likely not possible, further adding strength to the argument that such a use is critical.

In yet another evaluation of alternative chemistries, a straight-oil MWF formulated with 20% sulfur and 20% fats was used in a conventional press to fabricate stainless steel nuts. However, this alternative failed because of poor finished parts quality.

In a transfer press application, a chlorine-free stamping oil containing polymerized esters, block polymers, sulfur, and fatty compounds failed because of inefficient production. Using this “replacement” fluid, the equipment was able to produce only seven parts per die sharpening, compared to 7,000 parts per sharpening using a MWF containing chlorinated alkanes.

Historically, the cost of the MWF used in the manufacturing process is only a small fraction – perhaps three percent – of the total cost to manufacture a part. While the costs of the fluid itself are not inconsequential, tooling costs, labor to set up the tooling, and part manufacturing downtime for tool change-outs, far exceed the MWF when assessing total manufacturing costs. This is why customers stick with proven MWFs containing MCCAs or LCCAs instead of chlorine-free chemistries when the difference in total cost per part, in terms of parts manufactured, is in more than several orders of magnitude difference.\(^6\)

ILMA would like to comment on a statement made by Maria Doa during the June 3 meeting. We thought we heard her say that, under the “Stockholm Convention,” there were only two uses of chlorinated alkanes deemed “critical” and approved for use. ILMA is not aware that SCCAs have been added to the list of Persistent Organic Pollutants (“POPs”) under the Stockholm Convention, even though SCCAs have been voted on six times. Perhaps Dr. Doa meant that, under the European

\(^6\)Based on the discussion at the June 3 meeting, ILMA is attempting to collect cost-comparison information on alternative chemistries to MCCAs and LCCAs.
Union’s (“EU”) REACH regulation, the use of SCCAs has been restricted to mining belts and dam sealants. Similar to the U.S., ILMA understands that the EU market has moved away from SCCAs to MCCAs, and the European Chemicals Agency (“ECHA”) has not banned or restricted the use of MCCAs or LCCAs, including in MWF applications. In fact, last year, ECHA noted that MCCAs up to 50% chlorination by weight are “readily biodegradable and so do meet the Annex XIII [of REACH] persistence criteria.”

MCCA and LCCA manufacture and use in Europe and Asia are much larger than the U.S., so ILMA does not believe EPA should consider its actions as part of a larger international action to restrict or ban these substances.

During the June 3 meeting, EPA requested more specific information regarding what specific chlorinated alkanes (e.g. carbon chain length and the percentage of chlorination) are being used in specific uses ILMA deems as critical. While we were able to identify quickly the carbon chain length and chlorine content of the MCCA used in titanium grinding, as ILMA conveyed during the meeting, the collection of the balance of specific data is likely to be difficult. However, ILMA intends to work further with its members to collect that information and have it for use by EPA by June 30, 2015.

Realistic Timing Considerations

ILMA firmly believes an avenue exists to continue responsible use of MCCAs and LCCAs. However, if EPA ultimately determines that the substances present an “unreasonable risk” and must be completely removed from the market, a sufficient transition time must be provided. A “drop dead” date of May 2016 to cease the manufacture and importation of MCCAs and LCCAs is not realistic. In order to accommodate the needed reformulations of the MWFs, conduct tooling and other tests that must be run, replace machinery in some cases, and go through re-certifications and re-approvals (many involving third parties), a minimum transition time of five (5) years will be needed. At the end of the day, as ILMA mentioned during the June 3 meeting, the Association firmly believes there will be a percentage of critical applications for which no viable and acceptable alternatives to MCCAs and LCCAs will be found.

As expressed in ILMA’s June 5, 2015 letter to EPA, it is also imperative that the Agency issue a formal statement regarding the pending ban date of May 2016. Substantial confusion exists in several downstream industries that will be heavily impacted in the event MCCAs and LCCAs are no longer available in U.S. commerce after that date. In order for the industry to appropriately assess the situation and proceed, EPA must first acknowledge the proposed ban date. Even if substitute formulations for MWFs containing MCCAs and LCCAs exist right now for certain applications – and alternatives are not available for all applications – there is insufficient manpower within the available time allotted to implement the changes to non-chlorinated alkane alternatives and more

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7From ILMA’s investigation into the possible regulation of MCCAs and LCCAs in the EU, the current discussion there appears to be over the form and extent of testing.


9Based on data provided from the International Chlorinated Alkanes Industry Association as presented at the April 22, 2015 International Chlorinated Paraffins Conference in Beijing, China.
importantly, to gain appropriate certifications and approvals where necessary. There is significant concern about what will happen if EPA stays on the course to ban MCCAs and LCCAs by May 2016.

Survey of ILMA members on MCCA and LCCA Usage and Disposal

During the June 3 meeting, ILMA presented the results of its recent survey of Manufacturing Members to help EPA better understand the amounts of MCCAs and LCCAs purchased and used in MWF formulations in 2014, the distribution of those MCCAs and LCCAs in straight oil and in water-dilutable formulations, the number of establishments to which those formulations were sold, and MCCA and LCCA container waste handling procedures. Survey responses were received from 30 ILMA member companies, representing over 65% of the MWFs containing MCCAs and LCCAs used in the U.S. during 2014.

It is important to reiterate that ILMA members self-assessed which of the chlorinated alkane products they purchased last year were MCCAs or LCCAs. As a result, information contained in ILMA’s survey may be somewhat different than what the PMN submitters reported to EPA and likely includes “very long-chain chlorinated alkanes” (“vLCCAs”) reported as LCCAs.

Highlights of ILMA’s survey include:

- 2014 purchases of MCCAs were 7,943,773 pounds.
- 2014 purchases of LCCAs were 1,664,550 pounds.
- Members used 2,827,420 pounds of MCCAs in straight oil formulations and 2,908,500 pounds in water-soluble oils.
- Members used 1,098,347 pounds of LCCAs in straight oil formulations and 203,172 pounds in water soluble applications.
- Members sold water-dilutable MWFs containing MCCA and LCCA to 3,748 facilities.
- Members sold straight oil MWFs containing MCCA and LCCA to 2,652 establishments.
- Members sold both straight oil MWFs and water-dilutable MWFs to 2,383 facilities.
- Estimated annual releases to POTWs in 2014 from survey responders was 750 pounds total, a de minimus amount.
- Estimated annual releases to landfills in 2014 from survey responders were 7,740 pounds.
- Estimated annual disposal of chlorinated alkanes by incineration in 2014 from survey responders were 34,318 pounds.
- Not one responder reported that they themselves processed containers containing chlorinated alkanes on site. Most responders indicated they either received their chlorinated alkanes in bulk or in reusable totes or, if they did receive chlorinated alkanes in drums, those drums were sent off-site to a drum reconditioner for further handling.

ILMA realizes that these survey results for 2014 do not represent the totality of MCCA and LCCA MWF use. Nonetheless, ILMA believes the survey results do present statistically significant data on the overall usage and disposal practices of formulators – that is, ILMA’s Manufacturing Members – using MCCAs and LCCAs in the MWFs they make and sell to end-user customers. As promised, the full data set from the survey is attached for EPA’s review.
Waste Handling Practices of Aerospace Manufacturers in Southern California

On April 10, 2015, John K. Howell, Ph.D., President of GHS Resources Inc. (Edinboro, PA) and a consultant to ILMA, visited four aerospace manufacturing facilities using straight oil fluids for manufacturing titanium fasteners for the aerospace industry and Department of Defense. Dr. Howell was accompanied by Mike Pearce of W.S. Dodge Oil, Maywood, CA, and an ILMA Manufacturing Member. At three of the facilities, Dr. Howell and Mr. Pearce were able to participate in “front door-to-back door” tours of the facilities (at the fourth company visited, time constraints allowed only a meeting). During the tours, Dr. Howell observed the quality control aspects of the production process where each batch of parts manufactured were included on a multi-page batch production approval process flowchart so that each and every fastener and nut manufactured could be traced back to the date and time manufactured. Dr. Howell further observed the machine tools used for the titanium grinding applications, much of which was the older style of machine tool but which was entirely adequate for these applications.

Perhaps most importantly, Dr. Howell observed (and this was confirmed by shop representatives with whom he and Mr. Pearce spoke) that no used straight oil, chlorinated alkane titanium grinding fluid was discharged or allowed to enter any sanitary sewer. Instead, Dr. Howell saw how the facilities were set up for what those in the industry call “on site fluid reprocessing” – that is, the used MWF is brought to an on-site fluid recycling unit which removes metal fines or swarf\(^\text{10}\) and other solids, tests the fluid for proper amount of additives, and then adds back required additives to bring the fluid back to original specifications. The reprocessed oil is then recharged to the grinding machines and reused. Just as important, Dr. Howell observed that the small amounts of water waste generated during the recycling process were, instead of being discharged to sanitary sewers (and ultimately to a POTW) were collected in re-usable totes, which were sent off site to a wastewater processing company.\(^\text{11}\)

Dr. Howell concluded from his visits that the aerospace users of MWFs containing chlorinated alkanes in Southern California produced virtually no waste material containing chlorinated alkanes that ever reached wastewater.\(^\text{12}\) Dr. Howell believes the waste disposal practices observed by these companies are exemplary and represent the best practices in handling waste from metalworking operations.\(^\text{13}\)

\(^{10}\)Swarf is a byproduct of grinding operations. It is a mixture of metal fines and grinding grit that comes free from the wheel during the grinding process. Typically, swarf is drained of all free fluids and then sent to landfills.

\(^{11}\)As ILMA noted during the June 3 meeting, an alternative process is to treat wastewater in-house for disposal to a sanitary sewer/POTW. The typical fats, oil and grease content of the discharged wastewater is 1 part-per-million or less.

\(^{12}\)ILMA would add that the MWF removed from aqueous wash systems normally is not fit for in-house recycling and/or further use because of its contamination with cleaning agents. In Southern California, this used oil is collected and blended into bunker fuels for ships beyond the U.S. territorial waters. Also, California treats used oil as a “hazardous waste,” so these used products are tracked by a manifest system.

\(^{13}\)As mentioned during the June 3 meeting, if chlorinated alkanes are being disposed of to water, as estimated by EPA in its models, one would expect there to be huge issues today from oil slicks or sheens on waterways and at POTWs because of the relative concentration of MCCAs and LCCAs in both straight and water-dilutable oils.
Exclusion of Important Stakeholders from the Review Process

As previously expressed, ILMA remains concerned about the manner in which the EPA is reviewing the PMNs for MCCAs and LCCAs. EPA’s New Chemicals Program is intended to manage the potential risk to human health and the environment from chemicals new to the marketplace, in part, by functioning as a “gatekeeper” for the use of a new chemical before it enters into commerce. MCCAs and LCCAs are not “new chemicals,” having been produced and used in U.S. commerce since the mid-1930s.

ILMA firmly believes that EPA should stick with its published TSCA Work Plan to assess MCCAs and LCCAs under its TSCA Section 6 authorities. It is disingenuous to use the legal fiction of these substances as “new chemicals” to avoid public review and comment on the Agency’s risk assessments for MCCAs and LCCAs. By treating them as new chemicals, EPA has effectively cut out downstream stakeholders from the public review and comment process.

ILMA would encourage EPA to allow for public comment and peer review of the risk assessments for both MCCAs and LCCAs as explicitly stated on EPA’s website as part of its TSCA Work Plan. This open and public review process would allow for multiple stakeholders to express their concerns to EPA and provide an accurate illustration of the ramifications if MCCAs and LCCAs are removed from U.S. commerce by May 2016.

Conclusion

ILMA respectfully requests that EPA carefully consider the critical uses outlined in this letter and initiate the public comment and peer review process for both MCCAs and LCCAs. ILMA and its membership appreciate the opportunity to provide these comments and looks forward to further dialogue and engagement.

Sincerely,

Holly Alfano
Executive Director

Attachment: ILMA Survey Data

cc: Ken Moss, Team Leader, Notice and Regulations Management Teams
    ILMA Board of Directors
    ILMA SHERA and Metalworking Fluids Committees
    Andrew Jaques, Executive Director, Chlorinated Paraffins Industry Association
    John K. Howell, Ph.D.
    Jeffrey L. Leiter, Esq.
    Daniel T. Bryant, Esq.