Memorandum

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To: Public Record for the Final Rule: Streamlining the General Pretreatment Regulations for Existing and New Sources of Pollution
EPA Docket Number OW-2002-0007 (www.epa.gov/edockets/)

Date: September 14, 2005

Re: Example of New Sources More Efficiently Using Water

EPA used the attached water use information for the development of categorical pretreatment standards for existing sources (PSES) and new sources (PSNS) for the Pesticides Chemicals point source category (Part 455).

In the Pesticides Chemicals Technical Development Document**,** EPA identified that between "the 'Old' and 'New' plants, there is a difference in total wastewater discharges of 0.44 (from 1.55 to 1.11 gallons per pound of PAI [pesticide active ingredient] produced, representing a 28% reduction in flow."[1]

EPA also noted that "newer facilities have redesigned their processes and minimized their flows in significant ways compared to older facilities." EPA's finding that a "28% average flow reduction has been achieved at newer plants is based not just on reducing the volume of water used in the production process, but also on source reduction techniques that reduce the mass of pollutants in the effluent."

As demonstrated by the technology descriptions and case studies presented here and elsewhere in the docket supporting the Pretreatment Streamlining final rule, implementing water re-use and reduction technologies and pollution prevention practices can reduce the amount of water usage and the generation of pollutant mass in process wastewaters. These water re-use and reduction technologies and pollution prevention practices can reduce wastewater pollution discharged by industrial facilities, especially for those facilities that have on-site wastewater treatment systems. Many of these technologies and pollution prevention practices can also reduce the amount of wastewater pollution discharged by industrial facilities that do not have

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[1]U.S. EPA, 1993. "Development Document for Effluent Limitation Guidelines, Pretreatment Standards, and New Source Performance Standards for the Pesticide Chemicals Manufacturing Point Source Category," EPA-821-R-93-016, September 1993.

on-site wastewater treatment systems. Flow reduction can offer the following example benefits: (1) increased pollutant concentrations to on-site wastewater treatment systems which increase the efficiency of the wastewater treatment system; (2) decreased wastewater treatment system equipment sizes, resulting in reduced treatment system capital and operating and maintenance costs; and (3) decreased water and energy usage. In general, there is an economic incentive for facilities to use as little water as possible in their industrial operations.

Under the final rule, Industrial Users whose wastewater discharges are controlled by equivalent mass limits have more flexibility as they may elect to control their wastewater discharges through more efficient wastewater control technologies and pollution prevention practices (i.e., resulting in lower pollutant concentrations in the discharged wastewater) or more efficient water conservation practices (e.g., resulting in less wastewater volume discharged from an industrial operation) or both. EPA finds that this flexibility is beneficial to both the Control Authority and the Categorical Industrial User.

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Development Document For Effluent limitations Guidelines, Pretreatment Standards, And New Source Performance Standards For The

Pesticide Chemicals Manufacturing Point Source Category

(Final)

waters involves an increase in total plant discharges to other media, such as air emissions or solid waste disposal if the process wastewater cannot be reused effectively. The Agency generally agrees that this could be the case in some circumstances.

Therefore, EPA has revised its determination of the PAIs that should be subject to a zero-discharge limitation. As proposed, the final rule promulgates zero-discharge limitations for the 28 PAIs as to which zero discharge was based on total recycle and reuse of all process wastewater and for the one PAI that is manufactured without water and a no water use portion of the process for one other PAI. For 5 PAIs (of the 29 PAIs with revised limitations), acephate, captafol, norflurazon, pyrethrin I, pyrethrin II for which EPA proposed a "zero discharge" requirement based either on data that were below the current detection limit, no current discharge, or off-site disposal, EPA is promulgating numeric limitations in response to comments. To derive these limitations, EPA used the technology transfer procedures described above (utilizing LTA/MDL ratios and average variability factors) since performance data were unavailable (all data were below the current detection limit or there was no treatment or there was no treated effluent because the wastewaters were transported off-site for disposal).

Norflurazon was discussed previously as having revised limitations based on transfer of data from other PAIs treated with activated carbon; pyrethrin I and pyrethrin II, discussed earlier, have limitations based on hydrolysis treatment of benomyl; and acephate and captafol have revised limitations based on the transfer of full-scale incinerator scrubber wastewater discharge data. As discussed previously, regulation of glyphosate salt has been deferred and the last of the proposed zero-discharge PAIs, biphenyl, as discussed previously, has been dropped from coverage of this rule.

7.5.3 Calculation of Effluent Limitations Guidelines Under NSPS

NSPS represents the most stringent numerical values attainable through the application of the best available demonstrated treatment technologies. The achievability of costs to implement the best treatment technologies for new plants is considered when setting NSPS limitations. The pesticide chemicals industry is unique, however, in that expansion or changes in the industry are not likely to occur through the manufacture of currently-produced PAIs at new facilities. Instead, it is more likely that only new PAIs will be manufactured at new facilities. Since the nature of the treatability of new PAIs cannot be readily predicted, the Agency does not believe it is possible to develop NSPS limitations for new PAIs. However, EPA is setting NSPS limitations for all the PAIs which are covered by BAT limitations.

The Agency considered four options for NSPS limitations. Two options are the same as the two BAT options discussed previously: basing limitations on the demonstrated efficacy of BAT control technologies and requiring zero discharge. The other two options include basing limitations on the treatment performance data available for BAT technologies modified to reflect the capability for wastewater flow reduction at new facilities, and basing limitations on BAT treatment, flow reduction, and application of membrane filtration technology for further pollutant reduction.

As part of EPA's evaluation of options for NSPS and PSNS, the Agency investigated trends in reduction of contaminated wastewater discharges by newer manufacturing facilities. The Agency compared wastewater generation and discharge practices at these more recently built (i.e., newer) pesticide manufacturing plants with those at older plants. Specifically, EPA looked at the practices for manufacturing PAIs for which BAT regulations are being promulgated, most of which are produced at the older plants. The Agency compared the practices at the older plants to those practices used for similar production processes at the more modern plants. That is, the comparison involved a similar production process at the newer plant but not necessarily production of the same PAI. In many cases, the comparison was to the production of a PAI that is not covered by the final regulations due to lack of an analytical method for the new PAI and lack of BAT treatment performance data. The Agency found that an average wastewater volume flow reduction of 28% has been demonstrated at the newer facilities for similar production processes. This flow reduction has been achieved by increased recycle/reuse of wastewater and, in many cases, specific identifiable source reduction steps, such as increased source segregation of process streams to allow for more direct recycle within the process, and increased use of closed loop recovery systems with or without treatment.

The flow reduction evaluation consisted of reviewing the questionnaire responses to determine contaminated wastewater discharge flow rates and process age; comparing process wastewater discharge rates for each facility with their pesticide process starting and last modification dates for the PAI production process; and normalizing the discharge volume by dividing it by the annual PAI production volume. Although this analysis revealed a flow reduction trend, the dates reflected plant level startup or modification rather than startup of individual processes; these data were therefore too general to be used. A second evaluation looked at overall industry data comparing the 1977 and 1986 Manufacturers' Census. However, this method of evaluation also proved to be too general to be satisfactory since there was not sufficient process identification with respect to changes reflected in the different flow levels. The final evaluation method consisted of identifying which PAI manufacturing processes were in operation in 1986 that were not in operation during 1977, using the Manufacturers' Census for both years. Metallo-organic pesticides processes were excluded since they were required to meet zero discharge by the 1978 BPT rules and their process water needs are significantly different from those of organic pesticides processes.

Certain PAI processes (for organic pesticides) were also excluded from the analysis because they are associated with unique wastewater generation characteristics. Excluded were those processes which manufacture PAIs from other registered PAIs, either through the amination or esterification of 2,4-D compounds, bromacil, bromoxomyl, pentachlorophenol, endothall, or glyphosate, or through the purification of hexazinone, phosmet or malathion. Also excluded were instances where process wastewater was disposed of primarily by deepwell injection or incineration since deepwell disposal does not provide much of an incentive to reduce flows, and the incinerator flows represent scrubber water flows which cannot be further reduced on a daily discharge basis.

Out of a total of 36 processes (at 29 facilities) that were started-up since 1977, 25 processes (at 23 facilities) were identified in the flow per unit production analysis as "new plants". Two analyses of flow per unit production were made: first, all wastewater discharge volumes to treatment for each process were totaled to determine flow rates per process; and second, those wastewater discharges which resulted from specifically identified and quantified contact process streams (excluding scrubber blowdowns, stripper or distillation overheads, and contaminated stormwater) were totaled to estimate total discharge volumes from segregated, PAI-contaminated streams. While contaminated stormwater may also contain PAIs, it was excluded from the second analysis because control of stormwater reflects housekeeping and facility design more than process design.

Between the "Old" and "New" plants, there is a difference in total wastewater discharges of 0.44 (from 1.55 to 1.11) gallons per pound of PAI produced, representing a 28% reduction in flow. The difference between discharges of contact wastewater are even greater - - this analysis suggests that in newer processes only 52% of all wastewater discharged results from unsegregated process streams, as opposed to 70% in older facilities. This reduction reflects both the higher degree of source segregation practiced in newer processes, as well as a trend toward processes generating only scrubber or stripper overheads through the use of closed loop, solvent recovery systems. However, not included in this analysis was a determination of the degree of segregation between contact streams resulting from pre-PAI formation steps and post-PAI formation steps in the processes, a practice which is also more common in the newer facilities. Selective treatment, using PAI destruction/removal technologies of only contaminated wastewater streams could also reduce the flow to and therefore the cost of PAI treatment processes.

Based on these flow reduction data, it is evident that newer facilities have redesigned their processes and minimized their flows in significant ways compared to older facilities. Moreover, a number of manufacturers have provided evidence that even since the time of EPA's information collection for this rulemaking, plants have been doing more to achieve a reduction in effluent flow volume. Specifically, in their comments on the proposed regulations, two companies provided information on flow reduction measures (resulting from source reduction practices) that have been implemented at three existing plants since 1990. Four other commenters gave details of their intentions to implement further source reduction measures to achieve flow reduction in the near future at four facilities.

EPA's finding that a 28% average flow reduction has been achieved at newer plants is based not just on reducing the volume of water used in the production process, but also on source reduction techniques that reduce the mass of pollutants in the effluent. These source reduction techniques reduce both the volume of effluent and the mass of pollutants discharged. There are a number of different ways in which the newer generation of plants are already achieving source reduction. Some examples are presented below (these examples reflect techniques that have actually been employed at one or more of the newer generation of existing plants, as reflected in the record for this rulemaking):

- Redesign (reordering) of the steps undertaken to manufacture PAIs can reduce the overall amount of solvents and water needed in the production process as reaction and carrier media. This leads to a lower amount of spent solvents and wastewaters that need to be disposed of;

- New facilities can be designed to reduce the amount of piping between chemical process reactors and other equipment, such as storage tanks. Newer plants have the opportunity to locate pesticide chemical reactor vessels and other equipment closer together to reduce the amount of piping. Because there is a smaller amount of piping to wash periodically, there is a smaller volume of effluent generated due to equipment washing and a smaller mass of pollutants in the effluent;

- Solvents rather than water can be used to perform equipment washing. Generally, solvents are much more effective than water at washing because they absorb much greater levels of impurities (the solubility levels of pollutants in solvents are usually much higher than they are in water). Therefore, lower volumes of solvents can be used for equipment washes compared to water, and the solvents can be reused to a much greater degree than wash water can. Further, solvent washes that are no longer usable may be burned (i.e., used as a fuel). Contaminated water from equipment washes, however, has very little fuel value and can be incinerated only at a high cost. Equipment wash water therefore is more likely to have been discharged by older plants. (Because older plants may not have been designed and equipped to cope with flammability and explosion concerns that may be present when using solvent washes, they may have no choice but to use water rather than solvent washes.); and

- The manufacturing equipment can be designed and configured at newer plants to lead to greater recovery of equipment wash water and spills of reaction materials before they are contaminated, either through contact with the ground or through commingling with other wastestreams. Therefore, a greater portion of these flows can be reused rather than discharged (impurities introduced into these flows from ground contact or from commingling can render them unfit for reuse).

Moreover, even without employing source reduction practices, reducing the volume of water itself will lead to a related reduction in the mass of pollutants discharged because of more efficient wastewater treatment. It may well be that some water (or even source) reduction will, in some cases, lead to an increase in the pollutant concentration in wastewaters (for example, where process wastewater streams are segregated from non-contact streams, reducing dilution of the process wastewater streams). However, in such cases, because the volume of wastewater has been reduced, the treatment systems can be operated more efficiently and will ultimately remove a larger overall portion (mass) of the pollutants in the wastewaters than was removed prior to flow reduction. The data in fact show that the BAT control technologies, when properly operated, will generally reduce the level of pollutants to similar concentrations both before and after flow reduction. This phenomenon holds true for all of the control technologies identified in this rule as BAT technologies (i.e., hydrolysis, activated carbon, chemical oxidation, and biological treatment).

For example, assume that a unit of PAI production generates 1,000 gallons of wastewater with 100 ppb of pollutant, and that the control technology will reduce this level of pollutant to 1 ppb in the effluent. If the flow were reduced to 750 gallons of wastewater and the mass of pollutants were not reduced, the concentration of pollutants in the influent would increase to 133 ppb. The data show, though, that after treatment, a level of approximately 1 ppb can still be achieved in the effluent due to more efficient operation of the treatment system. As a result, a greater mass of pollutants has been removed by treatment in the latter case.

Therefore, to set NSPS limitations for PAIs, EPA used the BAT limitations and applied a 28% wastewater flow reduction to arrive at the mass-based NSPS (except as described below for three PAIs). This flow reduction was applied where BAT limitations are based on the flows at older facilities (of course, where the BAT is a zero-discharge limitation, NSPS is also set at zero discharge). At proposal there were two PAIs (carbofuran and DEF) with non-zero BAT limitations that were being produced at the more modern plants (also, limits for a third PAI, merphos, were based on technology transfer from DEF, one of the other two). Because these are newer plants, EPA assumes that they have both achieved flow reductions of at least 28% compared to older plants. Because there were insufficient data to quantify further flow reductions that might be possible, EPA proposed to set the NSPS limits for these three PAIs equal to the BAT limits. EPA received no further information from commenters on this approach for these three PAIs, and therefore the final NSPS limits for these PAIs are being promulgated as proposed.

7.5.4 Analysis of POTW Pass-Through for PAIs

Indirect dischargers in the pesticide manufacturing industry, like the direct dischargers, use as raw materials and produce as products or byproducts, many nonconventional pollutants (including PAIs) and priority pollutants. As in the case of direct dischargers, they may be expected to discharge many of these pollutants to POTWs at significant mass or concentration levels, or both. EPA estimates that indirect dischargers of organic pesticides annually discharge approximately 27,000 pounds of PAIs and 22,000 pounds of priority pollutants to POTWs.

EPA determines which pollutants to regulate in PSES on the basis of whether or not they pass through, interfere with, or are incompatible with the operation of POTWs (including interference with sludge practices). The Agency evaluates pollutant pass through by comparing the pollutant percentage removed by POTWs with the percentage removed by BAT technology applied by direct dischargers. A pollutant is deemed to pass through POTWs when the average percentage removed nationwide by well-operated POTWs (those meeting