Printers' National Environmental Assistance Center

Fact Sheet

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Computer-to-Plate (CtP) Systems and Environmental Compliance

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In recent years, Computer-to-Plate (CtP) imaging systems have become quite common and a natural extension of the digital prepress workflow. While these systems offer tremendous advantages from a productivity perspective, they are not necessarily problem-free from an environmental perspective. This fact sheet reviews the common environmental compliance issues associated with CtP systems and options for addressing them.

Introduction and Background

CtP systems allow the printer to complete their digital prepress workflow operation by allowing for the direct output of digital files onto a plate. As a result, the need for film, an intermediate image carrier, is eliminated. The new CtP imaging systems, based on lasers, enable the printer to produce plates with high-quality images. With the market forces of today demanding shorter runs with color, the CtP systems allows the printer to meet the challenges in a productive manner.

CtP is the laser exposure of a printing plate, which can be accomplished either on-press or off-press. It may happen with or without a plate processor. The imaging lasers fall into two broad categories, which are either thermal or visible light. Visible light lasers can be a green, red, or violet diode. There are several types of imaging platforms that are used, and they include internal drum, external drum, or flatbed. Systems are now available for all plate formats, speeds, budgets, and applications, which is why there is a wide variety of different types of CtP imaging systems.

The plate and the imaging emulsion are tied directly to the imaging laser used. The plate coatings undergo a physical and/or chemical change during laser exposure. The change allows the image to be transferred to the plate. Plates can either be aluminum or polyester-based with either a silver halide or photopolymer emulsion. Thermal systems can either harden the image area or ablate (i.e., remove) the nonimage area. Visible light lasers are used to image either photopolymers or silver halide image emulsions. The nonimage area is then washed away from the plate. Thermally imaged plates, once imaged, generally require a processing step, and this involves the use of alkaline (high-pH) solutions. Visible laser imaged plates with silver halide emulsions, once imaged, are being developed in a similar fashion to film negatives to remove the exposed silver halide.

Environmental Compliance Concerns

Even though the CtP systems are digital, the most common misconception regarding digital devices is that they are "green" or environmentally benign. The best statement to describe the

environmental issues associated with digital technologies is that they are different from conventional plate making and, while they can solve one problem, they are not immune from environmental challenges.

This concept applies to CtP systems as well since some form of chemical developing and processing is required by all visible and thermal photopolymer plates. CtP systems do eliminate film processing and all of the environmental compliance challenges associated with film, effluents, and silver, but they have their own unique compliance concerns. Depending upon the imaging system that is being used, each of the environmental challenges needs to be addressed to ensure compliance with environmental regulations**.**

Thermal Laser Plates Using Alkaline Developers

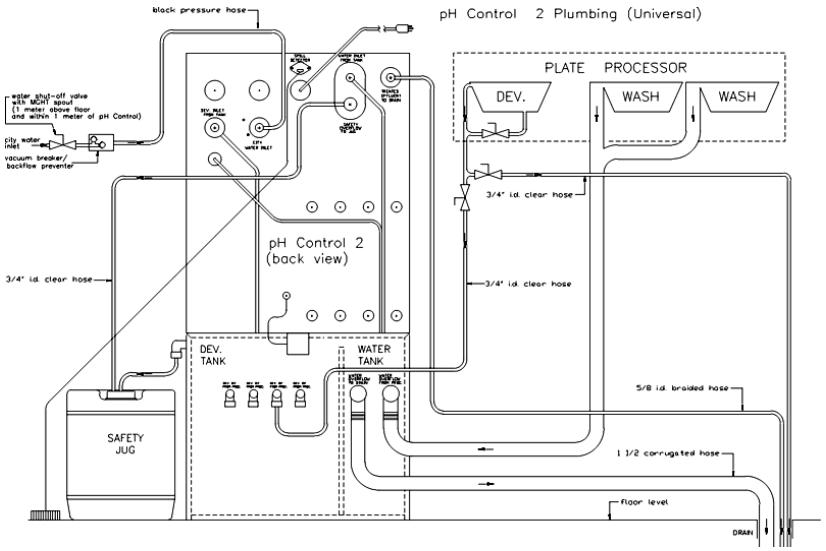
Many thermal CtP systems have pH levels of the waste developer in the 9.8–13.5 range. Waste with a pH at or above 12.5 is considered a hazardous waste and must be handled appropriately. If the pH of the system is above 12.5, an elementary neutralization system is required to discharge this waste to either your local sewer or prior to transferring to an evaporator to reduce the volume of the waste.

If the pH of the waste developer is at or above 12.5 and an elementary neutralization system has not been installed the waste will need to be shipped offsite as a **hazardous waste** with an appropriate vendor. If piping this waste to a holding tank, ensure the appropriate piping is installed that will not corrode. Also, this hazardous waste would count toward a facility's hazardous waste generator status and could change the facility's generator status depending on existing waste generation amount.

Use of alkaline developers with pH under 12.5 is preferable and will eliminate having to manage the waste as a hazardous waste. However, neutralization may still be required if the waste developer is to be discharged to the local sewer authority. If the effluent has a pH between 6-9, many municipalities will allow direct disposal down the sewer.

Universal Unit: (All thermal, photopolymer and violet laser chemistries)*

The unit shown below is a typical pH neutralization unit and is used to automatically treat the plate development chemistry to lower the pH.



Basic sequence of operation for a pH neutralization unit:

1. The system is connected directly to the processors overflow lines.
2. The process washwater is collected on one tank while developer effluent is collected in a separate tank while plates are being processed.
3. When the level switches in each tank are satisfied, the pH probe test function is activated. If the pH probe passes this test the process washwater and developer effluent are pumped into a reaction tank for treatment.
4. Once the reaction tank has reached its operating level, a mixing motor is activated and the pH probe reads and records the pH of the batch. If the pH falls outside of the acceptable range (this is programmable at installation and is based on each municipalities requirements), the unit will begin adding neutralizing solution. The pH probe continually reads the pH until the batch has reached the target pH (also programmed at installation).
5. Once the batch is within the compliant range, the treated effluent is discharged to drain under pressure. All data, date, time, incoming pH, amount of effluent treated, amount of neutralizing solution consumed, and out-going pH are recorded into memory.
6. Once the treated batch is completely discharged, the unit will clean the pH probe and look at the level switches again. If there is more chemistry to be treated, the cycle will repeat itself. It not, it will go into standby and wait.

* Diagram and basic unit description are compliments of Metafix.

<u>Visible Laser Plates Using Silver Halide</u>

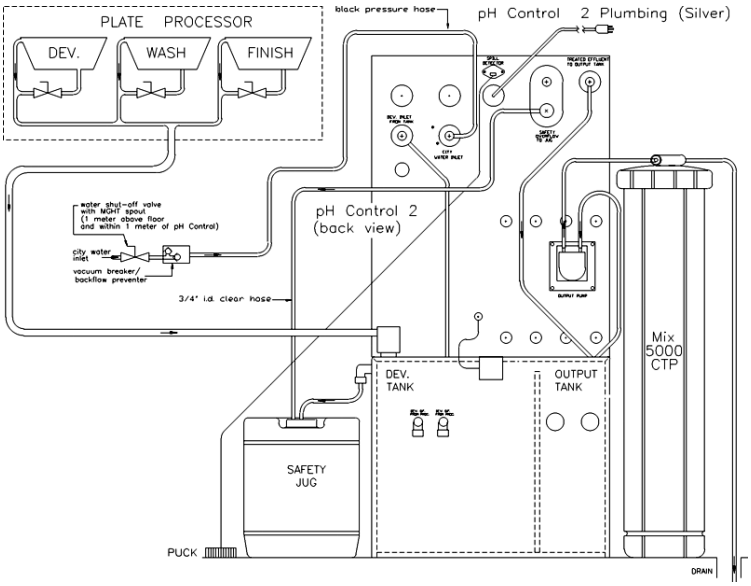
As with conventional film processing, the effluents from silver-halide-based CtP systems will contain silver. However, the one significant difference is the type of silver contained in conventional film-processing effluents. The silver from CtP systems is metallic, whereas the silver in conventional film processors is complexed or reacted with another chemical called thiosulfate. This means that the traditional electroplating, chemical recovery, or ion exchange columns can't be used to recover the metallic silver from the processor. Therefore, particulate filters will have to be used to remove the silver. Depending upon the discharge limit, one or more filters may need to be installed. Regardless of the type of silver in the effluent, silver concentrations at or above 5 ppm cause the effluent to be classified as a hazardous waste.

The discharge of silver is usually regulated by the local sewer authority. Almost every sewer authority has a specified concentration limit for silver in wastewater discharged to sewers; this limit is typically reflected in the local sewer code. Some of the limits can be very low (less than 1 part per million) and can be difficult to meet. Some sewer authorities have adopted the Silver Council's Code of Management Practice, which does not set a numeric limit for silver discharges, but requires the printer to recover a certain percentage of silver, which is based on the total volume of silver-bearing solution discharged.

In addition, the developing solution from the silver halide systems is alkaline. The pH of the solution is in the 9.8–13.5 range. As described above, waste with a pH at or above 12.5 is considered a hazardous waste and must be handled appropriately. If the pH of the system is above 12.5, an elementary neutralization system is required to discharge this waste to either your local sewer or prior to transferring to an evaporator to reduce the volume of the waste.

<u>Silver Recovery Unit: (For all silver bearing chemistries)*</u>

The unit shown below is a typical combination silver recovery and pH neutralization unit and is used to automatically treat the plate development chemistry to remove silver and lower the pH.



Basic sequence of operation for a silver recovery and pH neutralization unit:

1. The system is connected directly to the processors overflow lines.
2. The combined effluent is captured to the systems developer tank.
3. When the level switches in the tank is satisfied the pH probe test function is activated. If the pH probe passes this test the developer effluent is pumped into a reaction tank for treatment. Since there is usually no process-washwater in these systems, the reaction tank is only filling up with straight developer effluent.
4. Once the reaction tank has reached its operating level, a mixing motor is activated and the pH probe reads and records the pH of the batch. If the pH falls outside of the acceptable range (this is programmable at installation and is based on each municipalities requirements), the unit will begin adding neutralizing solution. The pH probe continually reads the pH until the batch has reached the target pH (also programmed at installation).
5. Once the batch is within the compliant range, the treated effluent is discharged to a second holding tank. All data, date, time, incoming pH, amount of effluent treated, amount of neutralizing solution consumed, and out-going pH are recorded into memory.
6. Once the level switch in this second holding tank is activated, the treated effluent is then pumped at a very specific rate through a Mix 5000 CTP column for desilvering. Upon exiting the column, the pH-adjusted de-silvered effluent is then directed to the drain.

* Diagram and basic unit description are compliments of Metafix.

Thermal Laser Plates Using Ablation

Ablation is a term that is used to describe the partial removal of the surface coating of the plate by a laser, which is usually the non-image area. Thermal lasers that ablate the plate fall into two categories, those that require processing and those that do not require processing.
For those that require processing, the developing solution is alkaline. The pH of the solution is in the 9.8–13.5 range. Waste with a pH at or above 12.5 is considered a hazardous waste and must be handled appropriately. If the pH of the effluent is above 12.5, an elementary neutralization system is required to pretreat it prior to discharge to either your local sewer or transferring it to an evaporator to reduce the volume.

For those that do not require processing, the ablation of the plate material results in the release of particulates and off gasses. In many instances, the plate imaging unit will have to be vented and these byproducts will have to be captured with a filter prior to their release. Many of these units come equipped with a filter. These filters will need to be properly maintained and serviced. In addition, some of the plates need to be washed with water or wiped down with alcohol to remove any debris prior to mounting the plate on the press.

Used Plate and Filter Disposal

To dispose of used plates and filters economically and minimize liability for improper waste disposal, they need to be characterized as non hazardous waste. Whether the used plates and filters are nonhazardous or hazardous is determined by testing them according to the Toxicity Characteristic Leaching Procedure (TCLP) test. Most vendors conduct this test for their plates and they should be able to give you this information so you don't have to have the costly TCLP test done. It is, however, recommended that the used plates be recycled for aluminum recovery instead of disposed in a landfill.

Environmental Permits

Regardless of the CtP system being utilized, there are several permits that could be required. Permits provide the legal authority to undertake a given activity. Permits should be viewed as a contract between the printer and the regulatory agency that allows the printer to engage in a specific activity under a specific set of circumstances called *terms* and *conditions.* The terms and conditions will establish the specific requirements that need to be followed and can include testing, monitoring, and reporting.
Permits for air emissions, wastewater discharges and/or hazardous-waste treatment may be required. In addition, your facility's spill prevention, control, and countermeasure (SPCC) plan may need to be updated. Prior to installing a CtP system, the local sewer authority and state or county hazardous waste authority should be contacted to determine if any permits are required.

Hazardous Waste Treatment Permit

In order to meet local sewer code or discharge limits, printers using systems with alkaline developing solutions, will have to neutralize the effluent prior to discharge or volume reduction with an evaporator. Printers should not place waste with a pH at or above 12.5 or silver concentrations at or above 5 ppm in an evaporator prior to neutralization because this would be "treating" a hazardous waste that would be subject to the onerous regulations that apply to hazardous waste treatment facilities.

Under the current Federal EPA hazardous waste rules (40 CFR 260.10), elementary neutralization is exempt from hazardous waste permitting requirements and no notification is required. However, state and local environmental protection authorities may require that a notification of activity be submitted or a permit obtained. It is imperative that those printers using these systems contact their state or local agency to determine if notification or permits are required.

Printers on a Sewer System

The most common scenario that printers encounter is the discharge of waste water to the local sewer authority. Printers who discharge wastewater to a sewer may be subject to a wastewater discharge permit. In most instances, printers are generally not required to obtain a discharge permit. However, there are some state and local sewer authorities that require industrial

discharges, including printers, to obtain a discharge permit. Even if a permit is not required, printers may have to complete an annual wastewater discharge survey. As well, the local sewer authority may have additional requirements.

Printers on a Septic System

Generally, most states do not allow any industrial wastewater to be discharged through a septic system. However, it may be possible to obtain an underground injection permit from the state environmental protection agency. These types of permits are difficult to obtain and the testing, monitoring, and reporting requirements can be quite extensive. For printers on septic systems, the best course of action would be to have all the facility's industrial wastewater (including CtP rinse water) either hauled offsite to a wastewater treatment plant or reduce the volume with an on-site evaporator. The sludge from the evaporator could be considered hazardous and will need to be shipped offsite using an appropriate vendor.
If the pH of the developer is below 12.5, it is not considered a hazardous waste. If discharging to an evaporator, the waste does not need to be pH adjusted. If hauling offsite to a wastewater treatment plant, pH adjustment will only be needed if the treatment plant requires it. In addition, if your CtP system uses Silver Halide, silver in the effluent will need to be reduced below 5 ppm to discharge to an evaporator or haul offsite as a non-hazardous waste.

Air Permit for Ablation Units

Air emissions from certain printing operations are highly regulated and in some states, simply venting a piece of equipment through a wall or roof can trigger the need for an air permit. Since these units may result in air emissions and if the unit is vented, the air permit requirements should be examined. The vendor should be consulted to determine the type and nature of these emissions. For printers who currently have an air permit, the installation of one of these types of units could trigger the need to modify the permit. Printers that are currently exempt from an air permit should examine their state or local air permit thresholds to ensure that they will remain exempt.

Vendors Offering Treatment Equipment

The list of vendors identified below is not to be viewed as being comprehensive. They represent a sampling of what is available. PNEAC does not endorse companies, nor does it make any representations or warranties with respect to the listed companies or their products.

Vendor	**Contact Info**	**Equipment and Services**
CPAC	Ph: (585) 382-3223 Web: www.cpacimaging.com Email: imaginginfo@cpac.com	Neutralization Neutralization/Silver Recovery
The Cronite Co. Inc.	Ph: (973) 887-7900 Web: www.cronite.com Email: info@cronite.com	Neutralization Neutralization/Silver Recovery
Evolve Technology Corp.	Ph: (888) 315-9007 Web: www.evolvetechcorp.com Email:info@evolvetechcorp.com	Neutralization Neutralization/Silver Recovery
Kodak Polychrome Graphics	Ph: (877) 574-7274 ext. 511 Web: www.kpggraphics.com Email: PEP@KPGraphics.com	Neutralization—CPAC Pallet, Tote, and Drum Return Consulting Services

Maratek Environmental	Ph: (905) 857-2738 Web: www.maratek.com Email: sales@marateck.com	Neutralization Neutralization/Silver Recovery
Metafix, Inc	Ph: (514) 633-8663 Web: www.metafix.com Email: sales@metafix.com	Neutralization Neutralization/Silver Recovery
Precision Environ- mental Services, Inc.	Ph: (978) 768-0011 Email: pes.inc@verizon.net	Neutralization Neutralization/Silver Recovery
Procam Controls	Ph: (972) 422-1212 Web: www.procamcontrols.com Email:procam@filterxpress.com	Neutralization Neutralization/Silver Recovery

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1. Computer-To-Plate Primer, Richard M. Adams and Frank J. Romano, GATFPress, 1999.
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7. An Introduction to Computer-to-Plate Printing, Agfa Corporation, 1999.

Specific questions about technology, equipment, vendors can be posted on the PrinTech listserv. To subscribe, simply follow the instructions on the PNEAC web site at www.pneac.org.

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Written: August 2005