SPECIAL SERIES: Parts Cleaning

The Recycle Option

For some, delaying the choice of an alternative cleaning system could be the right decision . . .

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The Montreal Protocol bans manufacture of substances that deplete the earth's upper atmosphere of ozone (Ozone-Depleting Substances or ODS). The U.S. Clean Air Act of 1992 specifically bans manufacture, after December 31, 1995, of CFC-133 and methyl chloroform (and other materials). Although not all countries signed the protocol, it is clear that ODS will not be used to any significant extent after about a generation from 1987.

But, before that next generation, some amounts of ODS will be available, at some price, for some time, in some locations. The ODS material will be available because: 1) Some is being stockpiled while it still can be manufactured; 2) Stockpiles can be used and mostly recovered through distillation for reuse; and 3) Third-world countries who haven't signed the Montreal Protocol (India and China, for example) may still manufacture ODS, and 4) Third-world countries who did sign the Montreal Protocol (Vietnam and Mexico, for example) may manufacture ODS at reduced rates through 2006 (a ten-year reprieve).

Users still enjoying the benefits of CFC-113 and methyl chloroform CAN continue to do so through the future existence of these ODS. Questions those users should ask are:

• Why would I want to delay conversion from CFCs? Why not do it now? What can I gain by delay?

• How do I use recycle (distilled) ODS material? Where do I get it? How reputable are the suppliers? How consistent is the quality?

• Will I have difficulty getting the quantities I need in 1996 and beyond? What prices will I have to pay? What risks am I taking?

There are several excellent reasons why you might want to delay your replacement of ODS.

1. You have not liked the type of replacement solutions recommended by regulators and offered by suppliers. You see that the types of replacements are changing, and you hope for better choices in one to two years.

(" . . . machine builders [in Europe] tell U.S. that two years ago all their customers wanted equipment for aqueous systems. Now, two years later, 98 pct of all the machines sold are tight chlorinated-solvent machines . . . "1)

Certainly the range of alternatives available to users through the SNAP (Significant New Alternative Program) is much more useful than it was three to five years ago. Political correctness has greatly diminished. Some volatile solvents useful for wipe cleaning applications have been exempted as VOCs. Equipment, especially semi-aqueous, costs much less today. Chlorinated solvents have been allowed via a practical equipment standard. Systems are considerably more integrated with both cleaning and drying provided in the same unit. The industry is undergoing a condensation with future players having more staying power. Many who converted in the early 1990s now regret their choice. Enclosed machines with affordable prices have reached the market.

Thus far, waiting has produced what many end-users (though not suppliers) would consider good results. Why not wait longer? Won't choices get better?

No question that choices will get better. Industry is listening to your inaction. But it is like buying a computer. If you wait for the optimum model, you will never own one. Tomorrow's units will always be better than today's units.

Better choices available in the next one-two years will include: lower-cost machines that are more enclosed, chemistries that are more easily recycled, and more solvent-based units.

2. You have not understood the changes made by regulators, and wish all would get on the same wavelength. You expect that regulators will become more forgiving in order to achieve increased compliance, and that OSHA and the EPA will work more closely together as the phase-out deadline approaches. You know there are new regulations coming that will affect the use of aqueous-based cleaning systems, but you do not know what that means. Further, you can read election results and editorial headlines as well as anyone. You know changes are coming in government structure and the way it regulates and enforces regulations.

" . . . what we need in Congress is 'Correction Day.' Once every quarter (or so), the public gets to petition Congress to void particularly stupid or impractical regulations . . . 2"

It is very unlikely the EPA will grant absolution about ODS. There is little or no sentiment in industry or among regulators to go back to use of ODS, and that would be strongly opposed by global environmental and scientific groups. You *will* have to replace your use of ODS with something else. This article is about the consequences of delaying that action. Forget absolution.

OSHA and the EPA will work more closely, though you will probably have to depend on private industry (equipment suppliers, consultants) to

rationalize just which of the control combinations in the chlorinated solvents NESHAP will also meet OSHA's concentration requirements (see the April 1995 issue of *Products Finishing* for advice on this matter).

The 1995 Metal Products Machinery Rule will require mass-based discharge permits for nearly all aqueous cleaning sites. The rule was signed on March 31, 1995, and will be available for public comment by the time you are reading this. You can get a copy from the EPA's bulletin board at 919-541-5742 in the "recently signed rules" section of the water section. You will have until about the end of August 1995 to comment on the rule. The EPA *will* acknowledge and seriously consider your comments.

In summary, you are betting on a "long shot" if you choose to bet on regulatory relief from your conversion from ODS to something else.

3. You do not have the capital to manage the change from ODS. You have heard the "horror stories" of those who have poured large sums of capital into this problem, made poor choices of replacement systems, and will need to find additional capital to implement better choices. Naturally, you have no wish to play that game.

". . . the check is in the mail . . . 3"

To some extent that is a valid objection. One message of this article is that you probably have an additional one to two years after the 1996 phase-out to acquire capital necessary to implement a good choice. And there are various experienced, unbiased resources you can use to make a good choice of replacement cleaning systems: state technology transfer agencies; the EPA starting through their stratospheric hotline (800-296-1996); advice through the parts cleaning column in *PRODUCTS FINISHING*; consultants; and books published by others, including Gardner Publications.

But, if you have not had the capital to convert from ODS since 1987 (the Montreal Protocol) or 1992 (the U.S. Clean Air Act), you probably do not have a business.

After all, the majority of conversions with which I have been associated had a positive cash payback. If you have done nothing to contain your emissions since 1987 or 1992, your capital payback after conversion is almost certain to occur in less than one year because of the high tax ($0.535 /lb on methyl chloroform) now imposed on ODS.

4. Your site is undergoing reorganization: downsizing; redefinition of roles of work groups; adding new operations or the reverse; or changing technology. For management reasons, you do not want this change to be intertwined with the change from ODS.

". . . been there, done that . . . 4"

If you have a plan that has been delayed, use the delay to improve it.

In summary, there *are* values to be gained by waiting for some time after the phase-out deadline of December 31, 1995, to complete your conversion from ODS:

• You *will* find better choices available.

• You *will* get more regulatory information to assist in a decision.

• You *can* make a good plan starting now, and find the necessary capital.

• You *can* change your operations so cleaning plays another role.

How do I operate my plant with recycled ODS material? Basically you do it the way you do now. You pay attention to the details.

What Recyclers Do. Spent cleaning solvents are those saturated with soil, not those degraded or converted to another chemical beyond capability of reuse for their original purpose. Cleaning solvents work by converting liquid or solid soils into a solution of soil within the solvent.

The soils can be removed by normal physical processes; chemical-based processes are not needed to recover cleaning solvents for reuse. In this case, soils are chemicals similar to the solvent: natural and synthetic oils; greases; cutting, buffing, stamping, and drawing fluids; natural and synthetic waxes. Additionally, the soils may include insoluble materials such as solid particulates or amorphous sludge.

Upgrading spent cleaning solvents to be reused means:

• Recovering clean solvent by filtration of the solids from the liquid solvent

• Separation of the lower-boiling (usually) solvent from the higher-boiling soils by distillation

• Management of the regulatory requirements, and paperwork

• Management of inventory and shipments

That is what recyclers do. They do not conduct chemical reactions or do cleaning tests. If your cleaning solvent needs a makeup of stabilizer, it is your responsibility to detect that and correct it (some recycler firms perform this service for additional cost).

Recyclers are almost always regional or local firms — though there may be some national affiliations. They do have to understand quality, inventory, transportation, and regulatory requirements. A good supplier of recycle services can be of significant value to you. A poor one can introduce contaminants to your process, involve you in a dispute with regulators, or stop your operations through failure to deliver product on schedule.

Choosing a Recycler Firm. You do not need any permits to use a recycle firm, other than those that you need to operate, which almost certainly includes an EPA identification number to generate or ship hazardous waste.

A reputable firm will have at least the following attributes.

• An EPA Part B permit for a Treatment, Storage, Disposal & Recycling facility

• A permit for the specific constituents of interest to you

• Appropriate state permits, which vary greatly among the states

Choice of a recycler firm is probably more critical to you than the choice of a firm to supply the cleaning solvents. There are plenty of sound reputable firms. But almost anyone

with a truck can claim to be a recycler

Differentiate among suppliers by the following, in order:

• Your opinion based on your tour and audit of their facilities. You would not marry without meeting your spouse first, would you? Does their site look like that of a supplier of pristine cleaning products or a junkyard? Remember, they play both roles!

• References from other customers

• Fate of soils and unrecycled material and how well disposal is done (your chosen firm should be able to recycle solvent *and* destroy [incinerate] the concentrated sludge)

• Absence of violations (ask your state agency for this, by type)

• Good record keeping of past work

• Years in service

• Testing by a local analytical lab of their recycled material vs virgin material

• Quoted speed of processing and meeting specifications

• Price

• Use of a "food-grade" truck for shipments to minimize contamination

Depending on the type of impurities, soil loading, and your specified quality, you should expect that around 80 pct of the pure material will be recovered for reuse.

You may have a variety of arrangements with a recycler firm. They may clean up your spent solvents and return about 80 pct to you. They may keep some or all of the recovered material. They may only sell recovered material to you. Generally, without specific extra payments, you will not get *your* solvent back. Your order will be filled when the recycler has sufficient solvent inventory to justify a distillation run. Your delivery will be from that blended inventory.

Beyond your own opinions and those of other customers, the fate of soils and unrecycled material is of great importance to you. Prefer a firm that, with proper control and permits, totally recovers or totally destroys (via incineration) unrecycled material. In this way, your possible legal liability is essentially nonexistent. You still have some liability if a firm landfills your unrecycled material, under proper control and permits.

Who Owns What? U.S. environmental laws stipulate "cradle-to-grave" ownership of hazardous chemical wastes. This simply means that you are responsible for all that happens in the unlimited future due to hazardous chemicals you have produced at your site5.

That statement sounds severe, and it is. But it should not deter you from using recyclers. A legitimate recycler will test your waste, develop a plan for its treatment and recycle, and inform you of that plan as well quote a price. You should ask for details of that plan as it involves other firms, because it can impact on you.

Some recyclers will tell you that they take over responsibility when they sign a manifest accepting your waste. That is not legally true. You still have downstream "cradle-to-grave" responsibility.

In practice, that downstream responsibility is minimal, because waste

solvents are usually commingled with others prior to refining. As stated above, the recyclers' records of past waste receiving, blending, and processing can be significant to you in leveling responsibility should an incident occur.

Prices and Availability. Today you should expect to pay around 60 to 80 pct of the price of virgin material. Obviously, you should expect to pay more after the phaseout of manufacture. The question is — How much more? The answer depends on how long after the phaseout you want to operate.

A spreadsheet model was created with the simple assumptions that price and volume are "perfectly" related (inversely proportional). Losses occur due to emissions from equipment and recycling, Equipment losses are within EPA's NESHAP and Industry inventory at phaseout is 20 pct of estimated global volume in 19966. Shapes of the volume and price curves with time are what should be expected. No one knows, or would say if they did, what the industry stockpile volume is (plus that which can be imported as contaminated from third-world non-signatories of the Montreal Protocol).

This graph (for illustration only) suggests that a one-year delay before conversion, and probably a two-year delay, can be taken beyond the phaseout date of January 1, 1996.

I concluded from my research for this article that the one- to two-year delay scenario seems "likely" for methyl chloroform. Also, some industry participants generally agree with either the time or the volume estimates. The same evidence suggests that there is less stockpiling of CFC-113, and the time where its price curve goes steep occurs sooner than two years from the phase-out.

At least three other factors will affect price: regional and local demand and type of solvent. These factors mean that there will not be much of a market in recycle CFC-141b because its industry use is relatively low, unless your site is located next to a major electronics plant where a relatively large amount is used. If you are a part of the metal manufacturing industries in the Midwest, you probably will have good access to recycled methyl chloroform at reasonable prices.

My research also suggests there is apt to be more recycled methyl chloroform available in the Midwest and west coast than there is in the east coast. I have no explanation for this results, but I believe it valid.

The final factor is third-world countries that are not signatories to the Montreal Protocol, and have the technical capability to manufacture ODS and need inward cash flow. Two such countries are China and Russia. Many environmentalists and recyclers believe there will be increased availability of ODS through import from some countries. One person I interviewed believed this will occur around 1997, when the market price has roughly doubled. You should recall that gambling is what they call a business plan based on speculation.

You can now see two costs of accepting a one- to two-year delay in converting from ODS. 1) Increased ingredient costs (this model suggests levels from $1 to $3.50 to $4 for methyl chloroform over two years). Remember, prices will fluctuate; and may be higher, or lower. 2) Savings lost by not converting from expensive ODS to lower-cost alternatives.

We have looked at reasons for delaying one to two years in making and implementing a conversion from ODS to an alternative system.

There is a valid business case for such a delay. The advantages are a more effective conversion and suitability to your overall needs. The drawbacks are cost uncertainty and uncertainty about continuity of quality and availability.

Are there societal arguments? Yes, but at this point they are not pertinent.

In 1996 the leadership positions in conversion from ODS will have been taken. How about protection of the ozone layer? Well, unless more ODS are synthesized by third world countries, the existing inventory of ODS ultimately will be vented to the upper atmosphere without regard to your decision. And there likely will be a change in U.S. laws to limit import of ODS if a pirate country sets up an offshore ODS factory. Short-term concerns about human heath or safety are not an issue in this decision.

Only you can decide if the choice is right for your organization. In March 1995, recycled stocks of methyl chloroform are as low as they have ever been.[7]

If this choice appeals to you, my advice about implementing it is:

- Do it as a team action.
- Set a timetable for decision and a path of milestones to make and implement that decision.
- Make sure you get all possible advantages of a delay. Increase your efforts to get good information that will lead you to a good decision in 1997. Closely follow federal and state environmental decisions and released rules. Start a "sinking fund" now so the capital will be available when needed. Plan now to include implementation of your decision among your other priorities.
- Work to minimize the drawbacks of a delay. Consider buying your future needs in advance — you will always be able to sell excess at a profit.
- Choose your recycler now. Let it know your requirements and plans.
- Get a good night's sleep! **PF**

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1. Lyman, Patricia, "DOW Promotes Efficient Use of Solvents", *Chemical & Engineering News*, March 20, 1995, p 16.
2. U.S. Representative Newton Gingrich, "Restoring American Civilization," a course presented by ME/U, February 4, 1995.
3. Anonymous
4. Anonymous
5. Code of Federal Regulations, January 1985, pages 633, 634, 655.
6. UNEP, "Protecting the Ozone Layer — Solvents, Coatings and Adhesives," Volume 2, United Nations Publication 92-III-D.7, January 1995.
7. Personal communications from industry representatives, March 1995.

TABLE I—

Firm	Location	Phone	Operating Region
ChemCare (division of VWR)	Seattle	800-234-4588	National
Chem Waste	CA	818-334-9002	West Coast
Clean Harbors	MA	800-282-0058	East Coast to National
Heat	TX	214-637-6434	Midwest
Laidlaw Environmental	OK	918-446-7434, or 800-346-3125	East Coast to Midwest
Marisol	NJ	800-524-0436	East Coast
Romic Environmental Technology	Bay Area, CA	415-462-2323	West US to Midwest
Safety-Kleen	OH	800-768-5955	East Coast to National
Waste Research and Reclamation	WI	715-834-9624	Midwest

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