



# Graffiti Remover Research and Field Test Report: The Search for Safer Products

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*The Center for a New American Dream in cooperation  
with the City of Portland Office of Sustainable Development*



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# Introduction

## **“Environmentally Preferable”**

means products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.

*—Federal Executive Order 13101, “Greening the Government Through Waste Prevention, Recycling, and Federal Acquisitions,” signed on September 14, 1998 by President Clinton*

In May 2002 the City of Portland and Multnomah County, Oregon launched their Sustainable Procurement Strategy to explore safer, economical, more environmentally preferable products (EPP) in a variety of commodity areas. Subsequently, the City of Portland Office of Sustainable Development (OSD) partnered with the Center for a New American Dream (CNAD) to provide an intern to assist with product research.

As part of the sustainable procurement effort, a city and county employee task force examining cleaning and coating products realized that they had little information on the current use of graffiti removal products and potential alternatives. As graffiti remover products are typically strong solvents, the task force viewed it as a product area that poses significant employee and ecological risk. They were also concerned about volunteer community groups that may be using hazardous graffiti remover products without seeking proper information and training.

Unlike mainstream janitorial products, graffiti removers have traditionally received little attention when it comes to exploring “greener” alternatives; consequently, there was a minimal amount of existing material on the subject for the task force to draw upon. In the absence of existing information, the City OSD and CNAD decided to conduct their own review.

To facilitate the product analysis, CNAD and the City OSD established the following framework. First, CNAD inventoried the graffiti remover products and methods currently used by City bureaus and contractors and collected the products’ material safety data sheets (MSDS). Second, CNAD researched potential alternative products and collected their MSDSs. Third, CNAD contracted with the Zero Waste Alliance (ZWA) to determine the employee and environmental hazards associated with the chemicals identified on the MSDSs. Fourth, based on the ZWA analysis, CNAD ranked products according to potential human and ecological hazards. Finally, CNAD field-tested those products with lower environmental and human health hazard profiles in order to evaluate product performance.

This report encompasses the results of both the product content evaluation and subsequent field tests. It presents lessons learned and resources for the reader to apply when exploring low-risk graffiti remover products. It is not intended to offer definitive conclusions on how to safely remove graffiti, but rather serve as a starting point and guide for further exploration of the best graffiti removal practices. In doing so, this report also presents a framework that may be useful when exploring alternatives for other products.



# Project Process and Scope

This project was conducted in two phases: Phase 1 consisted of selecting products and evaluating their environmental and human health hazard potential; Phase 2 consisted of field-testing the less hazardous products and evaluating their performance. This report encompasses the results from both phases to formulate lessons learned and overall conclusions.

Not all of the possible graffiti remover products currently on the market were included in this case study. We believe, however, that our review represents a significant cross-section of the *types* of graffiti remover products currently available.<sup>1</sup>

In addition, this project was limited to evaluating the performance and potential end-use hazards of the selected products. It was beyond the scope of this project to conduct a life cycle analysis of each product; thus, concerns associated with product/ingredient origin, processing, distribution, and disposal were not evaluated.

Finally, it is important to acknowledge that using solvents of any kind may not be the best option. Painting over graffiti, using a dull razor/scrapper, or pressure washing by itself may be safer, more environmentally beneficial, and therefore, more appropriate options.

## Phase I: Product Content Evaluation

### APPROACH

#### Product Selection

First, CNAD inventoried the graffiti remover products currently used by City bureaus and contractors. Second, CNAD conducted internet research and corresponded with other cities and organizations to identify potential “greener” graffiti removal products. Eventually, CNAD identified 35 products and collected their MSDSs for review (refer to **Appendix I** for the complete list).

#### Content Evaluation Process

To assess the potential hazards of the 35 graffiti remover products, CNAD contracted with the Zero Waste Alliance (ZWA), a non-profit organization specializing in pollution prevention strategies. ZWA administers the

Chemical Assessment and Ranking System (CARS), a system that provides a framework for assessing chemicals that are regulated, targeted by state or federal agencies, or recognized by other reputable organizations as being of concern to human health and safety or to ecological health and the global ecosystem.

CNAD and ZWA staff entered the information collected from the 35 product MSDSs into the CARS database; this included ingredient name and component percent, chemical abstract services (CAS) registry number, and other product qualities such as pH, odor, VOC content, and application method as available. Where an insufficient amount of ingredient composition was listed on the MSDS, ZWA contacted manufacturers to receive more comprehensive ingredient information.<sup>2</sup>

<sup>1</sup> The mention of specific company and product names does not constitute endorsement by the City of Portland, the Center for a New American Dream, or the Zero Waste Alliance.

<sup>2</sup> ZWA sought further ingredient information when “trade secret” was listed on the MSDS and/or when staff felt that the ingredients/characteristics listed on the MSDS were insufficient to evaluate the potential hazards of the product. In some cases, ZWA staff were obligated to sign a non-disclosure agreement, thus resulting ingredient information could not be listed in this report.

**Persistent Bioaccumulative Toxin (PBT)** pollutants are chemicals that are toxic, persist in the environment, and bioaccumulate in food chains and thus pose risks to human health and ecosystems. The biggest concerns about PBTs are that they transfer rather easily among air, water, and land and span boundaries of programs, geography, and generations.

—U.S. Environmental Protection Agency

Products for which ZWA could not obtain sufficient ingredient information were not evaluated further.

Once all the product information was entered into the CARS database, ZWA staff analyzed the human and ecological hazards identified for each of the products according to ingredient composition. Building upon ZWA's results, CNAD used the following data sources as screening tools to rank the products from least to most hazardous (refer to **Appendix VI** for further information on these data sources):

1. Janitorial Products Pollution Prevention Project (JP4) — human safety (end-user) screening tool
2. Indiana Relative Chemical Hazard Score (IRCHS) — ecological and workplace hazard screening tool
3. The U.S. Environmental Protection Agency (EPA) Persistent Bioaccumulative Toxin (PBT) Profiler — ecological and human health hazard screening tool
4. California Proposition 65 List of Chemicals Known to the State of California to Cause Cancer — human health hazard screening tool
5. California Proposition 65 List of Chemicals Known to the State of California to Cause Reproductive Toxicity — human health hazard screening tool

CNAD staff selected these data sources for their ease of use, general recognition/acceptance, and/or their unique ability to address a particular concern. For example, while end-user human health hazard was a priority, CNAD also wanted to be able to assess the PBT characteristics of the products; the EPA PBT Profiler served as a rough guide for this purpose.<sup>3</sup> Using the ZWA

data and the screening results, CNAD ranked the products on a scale from 1 to 5, with Group 1 representing the most preferred, or best-in-class, products and Group 5 containing products with the most hazardous ingredients.<sup>4</sup>

## PHASE I RESULTS

### Product Ranking

The following outlines the results of the product content evaluation and the reasoning for ranking the products in their respective groups. These rankings are based on information available at the time this report was developed; as more information on these chemicals is collected over time, the screening results referenced here may become outdated. *Refer to **Appendix II** for the list of products categorized into the five groups, **Appendix III** for the products' ingredients and screening outline, and **Appendix VI** for further information on the chemical hazard lists referenced below.*

#### Group 1 (Best-in-Class)

The products in Group 1 contain ingredients that did not flag any concerns in the product content screening. The solvents used in these products consist of ethyl lactate, methyl soyate, and/or one or more of the dibasic ester compounds dimethyl glutarate, dimethyl adipate, and dimethyl succinate. Since CARS and other screening tools are designed to identify well-known chemical hazards, it was not clear if these ingredients had a clean profile in the screening tools because they are less hazardous or if they are newer chemicals that have not been extensively studied for hazardous characteristics. Consequently, ZWA staff contacted Mr. David DiFiore, of the

<sup>3</sup> As graffiti remover products are often used on exterior surfaces, they can easily end up in building/street run-off that subsequently enters waterways. If the products demonstrate PBT characteristics, they pose a threat to water quality, ecosystems, and then to humans via fish consumption and/or water or sediment exposure.

<sup>4</sup> CARS and screening tools used above only identify *known* chemical hazards and do not necessarily identify the synergistic effects of the hazardous ingredients; these tools simply help flag *ingredients* known to be of concern. As a result, the subsequent selection of the less hazardous products was based on the known hazards, judgments about the nature of the hazard, and how the product is used/applied.

U.S. EPA's Design for Environment program (DfE), about the hazard characteristics of these ingredients. Mr. DiFiore's reply indicated that the DfE technical group has evaluated these chemicals and given them a low concern rating compared to other solvents.<sup>5</sup>

### **Group 2**

Group 2 products contain ingredients with relatively low hazards; none of the products' ingredients were flagged as PBTs, carcinogens or reproductive toxins. Yet, unlike Group 1, some of the ingredients were flagged by the Janitorial Products Pollution Prevention Project (JP4) as ingredients of concern, although none of the ingredients found in this group were given higher than a "Use with Extreme Care" by JP4. Also, the products in this group do not have any ingredients that rate above 20 on the Indiana Relative Chemical Hazard Score (IRCHS). Refer to **Appendix VI** for further information on the IRCHS and JP4 ranking systems.

### **Group 3**

The products placed in Group 3 are similar to those in Group 2, except some of the ingredients were flagged by JP4 as "Avoid if Possible" and/or had an IRCHS above 20.

### **Group 4**

With Group 4 the hazard level significantly increases, as we begin to see products with ingredients that are flagged as PBTs and/or reproductive toxins. We also begin to see aerosol-only products.<sup>6</sup> Some of the ingredients are identified by JP4 as "Do Not Use," the most hazardous of JP4 rank-

ings. Also in this group are ingredients with an IRCHS as high as 29.

### **Group 5 (Most Hazardous)**

Group 5 products are similar to Group 4 except they all have at least one ingredient that is flagged as a carcinogen. Also, they all have at least one ingredient with an IRCHS of 30 or higher, with the highest at 37.5.

## **Related Findings: Dimethyl Sulfoxide**

During the chemical analysis and ranking phase, ZWA also discovered that some of the products contained dimethyl sulfoxide (DMSO), which in isolation presents a relatively low hazard, but displays other characteristics of concern. DMSO has the capability of penetrating the skin quickly and deeply without damaging the skin, while carrying other substances with it (one of its side effects includes an odd odor, similar to that of garlic, that emanates from the user's mouth shortly after use, even if contact is through the skin). Thus, it poses a unique risk in that any other chemicals in the graffiti remover, in the graffiti being removed, or the surface from which it is being removed could be quickly absorbed in the skin, thereby possibly exposing workers to unforeseen hazards.

Due to DMSO's properties, none of the products containing DMSO were selected for field tests. It is a good example of the importance of researching ingredients, as some user hazards are not obvious even with a MSDS in hand.

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<sup>5</sup> Excerpt from David DiFiore's March 11, 2003 email regarding certain solvents evaluated by DfE:

"The DfE program has reviewed ethyl lactate, methyl soyate, and the dibasic esters. Our review covers both environmental and human health concerns — based on data when it's available or structure-activity analogies, if not. All three of these chemicals have a more positive health and environmental profile than conventional solvents — in fact, we gave them each a low concern rating on both counts — health and eco."

<sup>6</sup> By avoiding aerosols, users reduce the amount of product in the air, which reduces human inhalation exposure. Also, aerosol products almost always contain more VOCs (volatile organic compounds) than non-aerosols. (*Cleaning for Health*, INFORM, Inc. © 2002)



# Phase II Product Performance

## APPROACH

### Field Test Product Selection

Upon completion of the product content evaluation and ranking, CNAD obtained product samples to test the effectiveness of eight of the 11 products ranked in Groups 1, 2, and 3; three of the products were not field-tested for reasons noted in **Appendix IV**. In addition, due to the large number of products ranked in Group 4, four of the Group 4 products were randomly selected and tested for comparison purposes. Otherwise, products ranked in Groups 4 and 5 were not tested due to the hazards they presented. Ultimately, CNAD field-tested 12 products; they are listed in **Appendix IV**.

### Field Test Parameters

Field-testing the twelve products involved removing a variety of graffiti (spray paint, lipstick, correction fluid, markers, etc.) from several different types of painted and unpainted surfaces (cement, plastic, metal, wood, brick). CNAD used the following evaluation criteria:

- Ability to remove graffiti — complete, shadow remains, no effect.
- Affect on surface — no affect, removes or smears surface paint, corrodes surface, etc.
- Ease of use — application method, timeframe needed to remove graffiti, level of scrubbing required.

In general, the field tests attempted to apply each product to a broad cross-section of graffiti types and surfaces. Yet, in some cases products that were marketed for certain surface types were only applied to those surfaces, and testers sometimes used their discretion as to which surfaces were best suited for the products. Also, due to the random-

ness of available graffiti sites on testing days, the products were not always tested on exactly the same combinations of graffiti and surface. Thus, the field test results do not necessarily provide definitive conclusions on how *all* the products perform on *all* types of graffiti and surface combinations. Rather, the results represent the experiences of the testers and what they were able to access on testing days.

### Tools Used

In most cases, on smooth, non-porous surfaces (such as metal and plastic) testers used paper or cloth towels and “gentle” scrub pads with the products.<sup>7</sup> In some cases, a water rinse helped to remove excess product/graffiti, but towels also served this purpose well. For more porous surfaces (such as concrete and brick) testers used a stiff brush and/or water rinse with the products.

## PHASE II RESULTS

### Summary of Field Test Results

Overall, the field tests revealed that less hazardous graffiti removal products perform as well as, or better than, the more hazardous products. The following highlights the “best performers” during the field tests according to surface type. Also, refer to **Appendix V** for an outline of field test notes on all the tested products by name, and refer to **Appendix VIII** for pictures of some of the field test results.

- On *unpainted and/or painted smooth, non-porous* surfaces the Enviro-Solutions™ Paint Stripper & Graffiti Remover and SOYsolv® outperformed the others; these products were less likely to disturb surfaces and presented the lowest hazard level (both products are ranked in Group 1).

- For *unpainted porous* surfaces,

**Overall, the field tests revealed that less hazardous graffiti removal products perform as well as, or better than, the more hazardous products.**

<sup>7</sup> “Gentle” scrub pad refers to household-type “scratchless” scrub pads safe for cleaning “non-stick” dishware surfaces.

one product stood out as being very effective. Taginator® (ranked in Group 2) performed well on brick, unpainted concrete, and wood despite the lack of a pressure washer during testing (as recommended within the product instructions); with a pressure washer, the product may have performed even better. The only observed drawback to the product was its very strong smell.

- For *painted porous* surfaces, CNAD did not find a product that was able to completely remove the graffiti while not disturbing the surface paint. Yet, SOYsolv® and a few other lower-hazard products were successful in dulling the graffiti without affecting the surface too much, making painting over the graffiti more effective.

As for application tools, testers found that using a “scratchless” scrub

pad could make a significant difference in product effectiveness on smooth surfaces. For example, using just a paper or cloth towel with many of the products, whether in Group 1, 2, or 3, was sometimes insufficient; but in many such cases, using a scrub pad made removing the graffiti easier and more effective. For rough or porous surfaces, a stiff brush was useful, but not always necessary, especially when a water rinse was applied.

In general, testers also found the time period needed for effective removal varied significantly by the type of graffiti and surface. Although some of the products’ directions recommended letting the product sit for a period of time before wiping or rinsing, this was not always necessary; yet other times, a wait period eased removal.

**Table 1: Field Tests’ “Best Performers” Summary**

Surface	Product(s) with Best Field Test Results	Hazard Ranking*	Application Tools Often Used	Other Comments
<b>Smooth, non-porous, painted or unpainted</b>	Enviro-Solutions™ Paint Stripper & Graffiti Remover	Group 1	Towels (paper or cloth), “scratchless” scrub pad	Wait time after application varied depending on surface and age of graffiti (3 min. average wait time during field tests). Sometimes no wait time was required. On really old or large graffiti sometimes it was often better to just paint over the graffiti.
	SOYsolv®	Group 1		
<b>Porous, unpainted (i.e. brick, concrete)</b>	Taginator®	Group 2	Water rinse, stiff brush (pressure washer not used but recommended)	Wait time after application varied depending on surface and age of graffiti. Average wait time during field tests: 15 minutes. Product has a strong smell — recommend using only in well-ventilated areas.
<b>Porous, painted (i.e. painted concrete)</b>	No product was completely successful at removing graffiti without also smearing the surface paint - although, some products like SOYsolv® dulled the graffiti without disturbing the surface paint too much, which may make painting over the graffiti easier.			

\*Based on CNAD/ZWA analysis — refer to “Phase 1 Results.” Group 1 represents the least hazardous, Group 5 the most.

**A Note on Safety**

This report reveals there are safer, effective graffiti remover products on the market, yet we should emphasize that these characteristics are all relative; no matter what the product, graffiti removers are solvents that are meant to remove paint, and thus warrant user caution. It is important to follow use, personal protection, storage, and disposal guidelines according to the product MSDS. For most products, person-

al safety gear involves using appropriate gloves and safety goggles when working in areas with good ventilation. Otherwise, product use may also require chemical resistant clothing and an appropriate personal respirator (especially when using aerosol products). When outside, always stand upwind from where you are spraying, and do not spray in areas or during times when others could be inadvertently exposed to the liquid or vapors.

# Cost Evaluation

**Even if the initial costs of the traditional hazardous products are slightly less expensive than the safer graffiti removal products, they may have long-term costs that render the initial savings meaningless.**

Product price varies due to a number of factors, most notably, by purchase volume and the availability of local distributors. However, the product price inevitably influences product choices, so to facilitate a *rough* price comparison between the safer and conventional products in this report, CNAD investigated their non-bulk suggested retail prices.

Overall, we did not find that the products in Group 1 or 2 were more expensive than their conventional counterparts. In general, their prices ranged in the middle, with some conventional products being less or more expensive. Given this, it is likely that the overall *cost* of switching to safer graffiti remover products will not increase current expenses, in fact, it may decrease. With safer products, additional savings may be realized in other related areas such as:

- Reducing personal protective gear expenses
- Reducing/eliminating hazardous waste costs associated with graffiti removal products
- Eliminating costs associated with aerosol can disposal

- Reducing/eliminating costs associated with replacing surfaces damaged by graffiti removal products

- Reducing the risk of workers compensation claims and sick days

It is important to note that this cost evaluation is merely speculative. A full cost comparison would have taken into account the product price, the above associated costs, and tracking the amount of product required to remove a specific area of graffiti. Such a comprehensive cost analysis was beyond the scope of this project due to limited resources. Yet, we chose to include this cost evaluation section to facilitate a brief discussion on the price versus cost of using these products.

Consequently, with so many factors affecting the total cost of using any of these products, it seems reasonable to shift product selection criteria towards product performance and hazard level. Even *if* the initial costs of the traditional hazardous products are slightly less expensive, *they may have long-term costs that render the initial savings meaningless.*

## Conclusion

This case study demonstrates that the inherent hazard of graffiti removal products varies considerably. However, *the effectiveness of the product is not related to the inherent hazard. Many of the less hazardous graffiti removal products perform as well as, or better than, the more hazardous products.* The following section reviews some of the related findings and possible next steps.

### RELATED FINDINGS

#### Application Tools

One key lesson learned is that the application tool used can make a big difference in product effectiveness. During the field tests, “scratchless” scrub pads were used very effectively in cases where graffiti did not come off easily with just a towel (paper or cloth). For more porous surfaces, utilizing a water rinse (or even better yet a pressure washer) can also improve graffiti removal.

## Time Management

Another lesson learned involves being creative with time management. Since some of the products were more effective if allowed to sit for a few minutes, being able to maintain productivity involved changing removal approach. For example, when approaching several areas of graffiti in one block, it was more effective to apply the remover product to all the graffiti first, and then go back to the first area applied to start wiping/scrubbing/rinsing off the graffiti; this process gave the product time to sit while working on other areas.

## Deceptive Marketing

During the product selection phase of this project, it was also interesting to learn how many products are marketed using words such as “earth-friendly,” “biodegradable,” “non-toxic,” etc., and how misleading many of the claims were. In addition to potentially violating Federal Trade Commission regulations, this demonstrates the importance of investigating product ingredients instead of relying on marketing claims. **Appendix VII** lists some resources, both online tools and organization contacts, that are useful when trying to look beyond marketing declarations.

## AREAS FOR FURTHER INVESTIGATION

As mentioned throughout this report, there are many areas of graffiti removal this case study did not address.

1. This report only serves as a snapshot of the many types of solvent-based graffiti removal products that are currently on the market. Yet hopefully, this report gives the reader enough insight to feel comfortable trying different products, to know what questions to ask, and to know where to find answers. In particular, **Appendix III** lists the ingredients found on MSDSs

for the products reviewed in this report and identifies some of the associated hazards; similar ingredients are likely found in other graffiti remover products. Thus, **Appendix III** can be used to help identify hazards in other graffiti remover products not reviewed in this report. Also, **Appendix VII** lists resources the reader can use for their own evaluation of product ingredients.

2. As mentioned in the scope, this project did not attempt a life-cycle analysis of these products; nor did CNAD extensively evaluate the VOC (volatile organic compound) content of these products (which can attribute to ground-level ozone). There are also non-regulated chemicals, which are not required to be listed on a product’s MSDS, that may still pose some hazard; some of these ingredients may have been overlooked because of our initial emphasis on using MSDSs. To this end, more research is needed.

3. Third, this report did not address other (non-solvent) types of graffiti removal and prevention. Besides painting over graffiti, there are other methods such as coating products that, when applied to buildings/structures, are designed to make graffiti removal easier. Also, there are numerous prevention techniques such as planting vegetation, improving lighting, maintaining the appearance of buildings, and creating community murals that can reduce the need for graffiti removal.

All the above are examples of areas for further discussion. Even within the scope of this project, as more research is compiled on the effects of various chemicals, the product content evaluation section of this report may soon become outdated. Thus, to reiterate previous statements, this report provides a groundwork for graffiti product research, important initial findings, and a stimulus for discussion — but should not be taken as a definitive set of conclusions.

For more information on how FTC regulations apply to “green” marketing claims, go to [www.ftc.gov](http://www.ftc.gov) and search for “environmental marketing guide.”

## BEYOND GRAFFITI REMOVAL PRODUCTS

While this project focused on graffiti removal products, many of the lessons learned can apply to other product areas. As with any “new technology,” incorporating new products into established work habits often requires employee training to account for different product application tools or approach — as demonstrated by the “scratchless” scrub pads and time management issues in this project. Thus, while switching to a new product may seem as simple as just directly substituting one for the other, product effectiveness can easily be compromised by a failure to look at how products are applied.

Furthermore, the framework used in this case study is applicable to other commodity areas; this framework consists of the following steps:

1. Inventory current product use
2. Determine priorities/product evaluation criteria
3. Identify alternatives
4. Research product characteristics/contents according to established criteria
5. Rank products according to findings and evaluation criteria
6. Field test a range of products
7. Develop conclusions and recommendations

As the above framework is flexible to the specifics of the commodity area, it serves as a useful tool when faced with the challenge of evaluating products according to emerging human safety, environmental, and/or performance concerns.

## CLOSING COMMENTS

This project grew out of the City of Portland and Multnomah County’s concerns regarding the human safety and environmental impacts of graffiti remover products. The amount of work involved, in terms of product research and performance tests, took the project beyond what most organizations (or individuals) have time for, especially as more workplaces are stretched to do more with fewer resources. Yet, we often use extremely hazardous materials on a daily basis. As the hazards and impacts of the hundreds of thousands of chemicals in the market are further researched and understood, we as consumers benefit by choosing the best products to ensure our safety and environmental integrity. Through this case study we learned some valuable lessons and tested a framework that will be useful towards this goal.

While we hope this report will serve as a resource for the reader, we also hope it highlights the need for comprehensive national safety standards. Expecting consumers to conduct the type of analysis contained in this report is not practical. Rather, all product ingredients should be evaluated for human and ecological impacts *prior* to consumer use. Furthermore, these standards would need to be developed in an open, consensus-based process with active involvement by environmental organizations, the scientific community, and industry representatives. Without such national standards, consumers will continue to unwittingly place a toxic burden upon themselves and future generations. As this report demonstrates, this burden is significant, but can be easily reduced or avoided.



## APPENDIX I: PHASE I — PRODUCTS REVIEWED

Product Trade Name	Manufacturer listed on MSDS
Aero-Strip Aerosol	Certified Labs, Division of NCH Corp.
Amnesty™ Jelled Graffiti Remover	W.W. Grainger Inc.
BG-Clean™ 617	BioGenesis Enterprises, Inc.
Bio T Graffiti Buster	BioChem Systems, Inc.
Chemstrip™ Aerosol	Chemsearch Division of NCH Corp.
D-Vandal™	Dynacco, Inc.
Enviro-Solutions™ Paint Stripper & Graffiti Remover #73	Enviro-Solutions™ Ltd.
Goof Off™ Graffiti Remover	Valspar Corporation
Graffiti Towels #1447	Interstate Products, Inc.
Graffiti-X	Champion Chemical Company
Hydroplus™ 504 Graffiti Remover	ICI Paints, Devoe Coatings
Lift-Away™ Graffiti Remover (aka Peel Away Graffiti Free)	Dumond Chemicals, Inc.
Lift-Away™ Graffiti Towels	Dumond Chemicals, Inc.
Lift>It Cleaner	TAP Plastics
Mineral Spirits	(general commodity — no specific manufacturer)
Mötsenböcker's Lift Off® #3	Mötsenböcker's Lift Off®
Mötsenböcker's Lift Off® #4	Mötsenböcker's Lift Off®
Mötsenböcker's Lift Off® #5	Mötsenböcker's Lift Off®
Magic Jell Graffiti Remover (aka GR-GR Graffiti Magic)	Interstate Products, Inc.
Misty® Vandalism Mark Remover	Chase Products Company
PGR®	State Chemical Manufacturing Company
RemovAll™ 310 (Spray Grade)	Napier Environmental Technologies Inc.
RemovAll™ 400 (Liquid Grade)	Napier Environmental Technologies Inc.
SoyPower™ Graffiti Remover (aka SoyClean®)	Interwest L.C. (& Soy Environmental Products, Inc.)
SOYsol® Graffiti Remover	SOYsol®
Superco Graffiti Buster	Superco Specialty Products, CNS Industries
Tagaway®	Equipment Trade Service Company, Inc. (ETS)
Taginator®	Equipment Trade Service Company, Inc. (ETS)
United 126	United Laboratories
United 526	United Laboratories
United 826	United Laboratories
Vandal Ender™	State Chemical Manufacturing Company
110 VMR Jelled Vandalism Mark Remover	Rochester Midland Corporation
Zep Erase®	Zep Manufacturing Company
Zep® Write Away	Zep Manufacturing Company

NOTE: This list was not intended to be exhaustive, but serve as a cross-section of the types of graffiti remover products currently available. Also, product names and manufacturers are listed only for reference purposes as they were marketed at the time of this study; product names, formulations, and manufacturers may change over time. The mention of specific company and product names does not constitute endorsement by the City of Portland, the Center for a New American Dream, or the Zero Waste Alliance.

**Group 1 (Best-in-Class)**

- Enviro-Solutions™ Paint Stripper & Graffiti Remover #73
- Magic Jell Graffiti Remover
- SOYsolv® Graffiti Remover

**Group 2**

- BG-Clean™ 617
- Lift>It
- Mineral spirits
- Taginator®

**Group 3**

- Mötsenböcker's Lift Off® #3
- Mötsenböcker's Lift Off® #4
- Mötsenböcker's Lift Off® #5
- Tagaway®

**Group 4**

- Amnesty™ Jelled Graffiti Remover\*
- Bio T Graffiti Buster II\*
- D-Vandal™ \*
- Goof Off®\*
- Graffiti Towels #1447
- Graffiti-X
- Hydroplus™ 504
- Lift-Away™ Graffiti Remover\*
- Lift-Away™ Graffiti Towels
- RemovAll™ 310
- RemovAll™ 400
- Superco Graffiti Buster\*
- United 126\*
- United 526
- United 826
- Vandal Ender™
- 110 VMR, Jelled Vandalism Mark Remover
- Zep® Write Away\*

**Group 5 (Most Hazardous)**

- Aero-Strip Aerosol\*
- Chemstrip™ Aerosol\*
- Misty® Vandalism Mark Remover\*
- PGR® \*
- Zep Erase®\*

NOTE: SoyPower™ was not ranked due to the unavailability of sufficient ingredient information.

\*To the best of our knowledge, these products are available *only* as an aerosol. Aerosols release a higher level of product into the air than non-aerosols, which increases human inhalation exposure. Also, aerosol products almost always contain more VOCs (volatile organic compounds) than non-aerosols. (*Cleaning for Health*, INFORM, Inc. © 2002)

**APPENDIX III: PHASE I — CNAD PRODUCT INGREDIENT SCREENING DETAILS**

Hazard Ranking	Product	CAS	Ingredient Name <sup>8</sup>	JP4	IRCHS	PBT <sup>9</sup>	Carcinogen <sup>10</sup>	Reproductive Toxin <sup>11</sup>
Group 1	Enviro-Solutions™ Paint Stripper & Graffiti Remover	1119-40-0	Dimethyl glutarate					
		627-93-0	Dimethyl adipate					
		108-65-0	Dimethyl succinate					
			Alcohol alkoxylates					
Group 1	Magic Jell Graffiti Remover	1119-40-0	Dimethyl glutrate					
		627-93-0	Dimethyl adipate					
		106-65-0	Dimethyl succinate					
Group 1	SOYsolv® Graffiti Remover	97-64-3	Ethyl Lactate					
		67784-80-9	Methyl Soyate					
Group 2	BG-Clean™ 617	67-63-0	Isopropyl alcohol	Use Extreme Care	14.2			
			Trade secret					
Group 2	Lift>It	34590-94-8	Dipropylene Glycol Monomethyl Ether	Use Routine Care	13.4			
Group 2	Mineral spirits1	8030-30-6	Naphtha	Use Routine Care	12.8			
	Mineral spirits2	8032-32-4	Benzine					
	Mineral spirits3	8052-41-3	Stoddard Solvent		11.6			
	Mineral spirits4	64742-47-8	Distillate Fuel Oils, Light					
	Mineral spirits5	64741-41-9	Atmospheric Gas Oil (Petroleum)					
	Mineral spirits6	64742-48-9	Hydrotreated Heavy Naphtha (Petroleum)					
	Mineral spirits7	64742-88-7	Solvent Naphtha, medium aliphatic	Use Routine Care	16.6			
	Mineral spirits8	64742-89-8	Solvent Naphtha, light aliphatic					
Group 2	Taginator®	108-65-6	Propylene Glycol Ether Ester		10.7			
		1310-58-3	Potassium hydroxide	Use Extreme Care	19.2			
Group 3	Mötsenböcker's Lift Off®#3	67-64-1	Acetone	Avoid if Possible	15.9			
			Trade secret					
Group 3	Mötsenböcker's Lift Off®#4	67-64-1	Acetone	Avoid if Possible	15.9			
			Trade secret					
Group 3	Mötsenböcker's Lift Off®#5	67-64-1	Acetone	Avoid if Possible	15.9			
			Trade secret					
Group 3	Tagaway®	111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			
		1310-58-3	Potassium Hydroxide	Use Extreme Care	19.2			
			Trade Secret					

**CATEGORY KEY**

Hazard Ranking: Result from ZWA/CNAD ingredient hazard analysis  
 CAS: Chemical Abstract Services Registry Number  
 JP4: Janitorial Products Pollution Prevention Product  
 IRCHS: Indiana Relative Chemical Hazard Score  
 PBT: Persistent Bioaccumulative Toxin  
 Carcinogen: EPA definition: any substance that can cause or aggravate cancer  
 Reproductive Toxin: OSHA definition: Chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

**PBT KEY**

P=Considered persistent by EPA PBT Profiler  
 P=Considered very persistent by EPA PBT Profiler  
 B=Considered bioaccumulative by EPA PBT Profiler  
 B=Considered very bioaccumulative by EPA PBT Profiler  
 T=Considered of moderate concern of chronic toxicity to fish by EPA PBT Profiler  
 T=Considered of high concern of chronic toxicity to fish by EPA PBT Profiler

<sup>8</sup> ZWA sought further ingredient information when “trade secret” was listed on the MSDS and/or when staff felt that the ingredients/characteristics listed on the MSDS were insufficient to evaluate the potential hazards of the product. In some cases, ZWA staff were obligated to sign a non-disclosure agreement, thus the resulting ingredient information could not be listed in this report.

<sup>9</sup> Based on EPA PBT Profiler. The PBT Profiler was designed to help interested parties voluntarily screen chemicals for persistence, bioaccumulation, and aquatic toxicity characteristics when no experimental data are available. The PBT Profiler uses a subset of P2 Assessment Framework computer-based tools to help identify chemicals that potentially may persist, bioaccumulate, and be toxic to aquatic life, i.e., PBT chemicals. [www.pbtprofiler.net](http://www.pbtprofiler.net)

<sup>10</sup> Listed under California Proposition 65 as a Chemical Known to the State of California to Cause Cancer, as of June 13, 2003. [www.oehha.org/prop65/prop65\\_list/Newlist.html](http://www.oehha.org/prop65/prop65_list/Newlist.html)

<sup>11</sup> Listed under California Proposition 65 as a Chemical Known to the State of California to Cause Reproductive Toxicity, as of June 13, 2003. [www.oehha.org/prop65/prop65\\_list/Newlist.html](http://www.oehha.org/prop65/prop65_list/Newlist.html)

**APPENDIX III: PHASE I — CNAD PRODUCT INGREDIENT SCREENING DETAILS (CONT'D)**

Hazard Ranking	Product	CAS	Ingredient Name	JP4	IRCHS	PBT	Carcinogen	Reproductive Toxin
Group 4	Amnesty™ Jelled Graffiti Remover	108-88-3	Toluene	Do Not Use	29.1	T		X
		8052-41-3	Petroleum Distillates	Use Extreme Care	11.6			
		107-98-2	1-methoxy-2-propanol	Use Extreme Care	18.5			
		34590-94-8	(2-methoxymethylethoxy)-Propanol	Use Routine Care	13.4			
		75-28-5	Isobutane				T	
		74-98-6	Propane			11.9	T	
Group 4	Bio T Graffiti Buster II	5989-27-5	Natural Terpene (d-Limonene)	Use Routine Care	7.8	<b>T</b>		
		872-50-4	N-Methylpyrrolidone	Use Extreme Care	7.1			X
		9016-45-9	Nonylphenol Polyethoxylate	Avoid if Possible	22.1			
			Nonionic Surfactant Blend					
Group 4	D-Vandal	64-17-5	Ethanol	Use Extreme Care	13.2			
		108-88-3	Toluene	Do Not Use	29.1	T		X
		111-90-0	Diethylene Glycol Monoethyl Ether	Use Routine Care	9.2			
		111-76-2	Ethylene Glycol Monobutyl Ether	Avoid If Possible	20.5			
		123-86-4	n-Butyl Acetate	Avoid If Possible	18.4	T		
		872-50-4	n-Methyl-2-pyrrolidone	Use Extreme Care	7.1			X
		74-98-6	Propane			11.9	T	
		75-28-5	Isobutane				T	
Group 4	Goof Off® Graffiti Remover	67-56-1	Methyl alcohol	Use Extreme Care	24.7			
		111-77-3	Diethylene Glycol Monomethyl Ether	Use Routine Care	17.5			
		106-97-8	butane		13	T		
		74-98-6	propane		11.9	T		
		100-41-4	ethyl benzene		24.3	T		
		1330-20-7	xylenes	Avoid If Possible	26.1	T		
		108-88-3	Toluene	Do Not Use	29.1	T		X
			Trade secret					
Group 4	Graffiti Towels #1447	1119-40-0	Dimethyl Glutarate					
		872-50-4	n-Methyl Pyrrolidone	Use Extreme Care	7.1			X
		106-65-0	Dimethyl Succinate					
		627-93-0	Dimethyl adipate					
Group 4	Graffiti-X	628-63-7	Amyl Acetate	Avoid if Possible	16.5	T		
		5989-27-5	d-Limonene	Use Routine Care	7.8	<b>T</b>		
		112-34-5	Diethylene Glycol Butyl Ether	Avoid if Possible	15.5			
		872-50-4	N-Methylpyrrolidone	Use Extreme Care	7.1			X
Group 4	Hydroplus™ 504	100-51-6	Benzyl Alcohol	Do Not Use	13			
		108419-34-7	Acetic Acid, c9-11-branched alkyl esters, c10-rich				<b>T</b>	
		141-43-5	Ethanol, 2-amino	Avoid if Possible	17.2			
		25265-71-8	Propanol, oxybis-		11.9			
		34590-94-8	Propanol, (2-methoxymethylethoxy)	Use Routine Care	13.4			
		67-68-5	Dimethyl Sulfoxide					

Hazard Ranking	Product	CAS	Ingredient Name	JP4	IRCHS	PBT	Carcinogen	Reproductive Toxin
Group 4	Lift-Away™ Graffiti Remover	1119-40-0	Dimethyl Glutarate					
		627-93-0	Dimethyl Adipate					
		872-50-4	n-Methyl-2-Pyrrolidone	Use Extreme Care	7.1			X
		5989-27-5	d-Limonene	Use Routine Care	7.8	<b>T</b>		
		9016-45-9	Alkylphenol ethoxylates	Avoid if Possible	22.1			
		74-98-6	Propane		11.9	T		
		106-97-8	n-Butane		13	T		
			Trade Secret					
Group 4	Lift-Away™ Graffiti Towels	1119-40-0	Dimethyl Glutarate					
		627-93-0	Dimethyl Adipate					
		106-65-0	Dimethyl Succinate					
		872-50-4	n-Methyl-2-Pyrrolidone	Use Extreme Care	7.1			X
Group 4	RemovAll™ 310	100-51-6	Aromatic Alcohol	Do Not Use	13			
		141-43-5	Monoethanolamine	Avoid if Possible	17.2			
		7732-18-5	Water, deionized					
		68477-31-6	Aromatic solvent					
Group 4	RemovAll™ 400	100-51-6	Aromatic Alcohol	Do Not Use	13			
		25265-71-8	Dipropylene Glycol		11.9			
		67-68-5	Dimethyl Sulfoxide					
		34590-94-8	Dipropylene glycol methyl ether	Use Routine Care	13.4			
		108419-34-7	Acetic acid branch chain alkyl esters				<b>T</b>	
Group 4	Superco Graffiti Bust	67-64-1	Acetone	Avoid if Possible	15.9			
		5989-27-5	d-Limonene	Use Routine Care	7.8	<b>T</b>		
		34590-94-8	Dipropylene Glycol Ether	Use Routine Care	13.4			
		68476-85-7	L.P.G.					
		107-98-2	Propylene Glycol Ether	Use Extreme Care	18.5			
		1330-20-7	Xylene (Xylol)	Avoid if Possible	26.1	T		
Group 4	United 126	123-86-4	n-Butyl Acetate	Avoid if Possible	18.4	T		
		108-88-3	Toluene	Do Not Use	29.1	T		X
		64-17-5	Ethanol	Use Extreme Care	13.2			
		111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			
		111-90-0	Diethylene Glycol Monoethyl Ether	Use Routine Care	9.2			
		74-98-6	Propane		11.9	T		
		75-28-5	Isobutane			T		
		872-50-4	n-Methyl-2-pyrrolidone	Use Extreme Care	7.1			X
Group 4	United 526	111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			
		5989-27-5	d-1, 8 (9)-p-menthadiene (d-Limonene)	Use Routine Care	7.8	<b>T</b>		
		9016-45-9	Nonylphenol ethoxylate	Avoid if Possible	22.1			
		872-50-4	N-Methyl-2-pyrrolidone	Use Extreme Care	7.1			X
		628-63-7	Amyl Acetate	Avoid if Possible	16.5	T		
		624-41-9	2-Methyl butyl acetate				T	



**APPENDIX III: PHASE I — CNAD PRODUCT INGREDIENT SCREENING DETAILS (CONT'D)**

Hazard Ranking	Product	CAS	Ingredient Name	JP4	IRCHS	PBT	Carcinogen	Reproductive Toxin
Group 4	United 826	111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			
		5989-27-5	d-1, 8 (9)-p-menthadiene (d-Limonene)	Use Routine Care	7.8	<b>T</b>		
		9016-45-9	Nonylphenol ethoxylate	Avoid if Possible	22.1			
		97-64-3	Ethyl Lactate					
		628-63-7	Amyl Acetate	Avoid if Possible	16.5	T		
		624-41-9	2-Methyl butyl acetate				T	
Group 4	Vandal Ender™	64-17-5	Ethanol	Use Extreme Care	13.2			
		68956-56-9	Terpene Hydrocarbons					
		5989-27-5	Orange Terpenes (d-Limonene)	Use Routine Care	7.8	<b>T</b>		
		97-64-3	Ethyl Lactate					
		127087-87-0	Nonionic Surfactant		7.3			
		64741-65-7	Mineral Spirits					
		872-50-4	n-Methyl-2-pyrrolidone	Use Extreme Care	7.1			X
Group 4	110 VMR, Jelled Vandalism Mark Remover	108-88-3	Toluene	Do Not Use	29.1	T		X
		75-28-5	Isobutane			T		
		111-76-2	2-Butoxy ethanol	Avoid if Possible	20.5			
		74-98-6	Propane		11.9	T		
		112-80-1	9-Octadecanoic acid		1.7	P		
		67-64-1	Acetone	Avoid if Possible	15.9			
Group 4	Zep® Write Away	64-17-5	Ethanol	Use Extreme Care	13.2			
		100-51-6	Benzyl Alcohol	Do Not Use	13			
		5989-27-5	d-Limonene	Use Routine Care	7.8	<b>T</b>		
		75-28-5	Isobutane			T		
		74-98-6	Propane		11.9	T		
		106-97-8	n-Butane		13	T		
Group 5	Aero-Strip Aerosol	75-09-2	Methylene Chloride		30.1		X	
		8052-41-3	Aliphatic Hydrocarbon	Use Extreme Care	11.6			
		67-56-1	Methanol		24.7			
		74-98-6	Propane		11.9	T		
		75-28-5	Isobutane			T		
		872-50-4	n-Methyl-2-pyrrolidone	Use Extreme Care	7.1			X
		111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			
Group 5	Chemstrip™ Aerosol	75-09-2	Methylene Chloride		30.1		X	
		8052-41-3	Aliphatic Hydrocarbon	Use Extreme Care	11.6			
		67-56-1	Methanol		24.7			
		74-98-6	Propane		11.9	T		
		75-28-5	Isobutane			T		
		872-50-4	N-Methyl-2-Pyrrolidone	Use Extreme Care	7.1			X
		111-76-2	Ethylene Glycol Monobutyl Ether	Avoid if Possible	20.5			

Hazard Ranking	Product	CAS	Ingredient Name	JP4	IRCHS	PBT	Carcinogen	Reproductive Toxin
Group 5	Misty® Vandalism Mark Remover	108-88-3	Toluene	Do Not Use	29.1	T		X
		67-64-1	Acetone	Avoid if Possible	15.9			
		67-56-1	Methanol			24.7		
		67-63-0	Isopropyl alcohol	Use Extreme Care		14.2		
		127-18-4	Perchloroethylene	Do Not Use		37.5	P	X
		74-98-6	Propane			11.9	T	
		106-97-8	n-Butane			13	T	
		71-55-6	1,1,1-Trichloroethane	Do Not Use		36.6	P,T <sup>12</sup>	
Group 5	PGR®	75-09-2	Methylene Chloride			30.1		X
		74-98-6	Propane			11.9	T	
		106-97-8	n-Butane			13	T	
		75-28-5	Isobutane				T	
		67-56-1	Methanol			24.7		
Group 5	Zep Erase®	127-18-4	Tetrachloroethylene	Do Not Use		37.5	P	X
		108-88-3	Toluene	Do Not Use		29.1	T	
		67-63-0	Isopropyl alcohol	Use Extreme Care		14.2		
		78-93-3	Methyl Ethyl Ketone	Do Not Use		27.9		

<sup>12</sup> Also listed in an EPA document called the “Draft RCRA Waste Minimization List of Persistent, Bioaccumulative, and Toxic Chemicals,” published in November 1998. The EPA has announced its intention to use this list to focus attention on these chemicals, in order to reduce their presence in hazardous waste by 50 percent by 2005.

**APPENDIX IV: PHASE II — GRAFFITI REMOVER PRODUCTS  
INCLUDED/NOT INCLUDED IN FIELD TESTS**

**Products Used in Field Tests**

BG-Clean™	Mötsenböcker's Lift Off®#3
Enviro-Solutions™ Graffiti Remover	Mötsenböcker's Lift Off®#4
Lift-Away™ Graffiti Towels	SOYsolv® Graffiti Remover
Graffiti-X	Tagaway®
Lift-Away™ Graffiti Remover	Taginator®
Lift>It <sup>13</sup>	Vandal Ender™

**Products Not Chosen for Field Tests**

Product Name	Reason Not Tested
Aero-Strip Aerosol	Ranked in Group 5
Amnesty™ Jelled Graffiti Remover	Ranked in Group 4 – not randomly selected
Bio T Graffiti Buster II	Ranked in Group 4 – not randomly selected
Chemstrip™ Aerosol	Ranked in Group 5
D-Vandal™	Ranked in Group 4 – not randomly selected
Goof Off® Graffiti Remover	Ranked in Group 4 – not randomly selected
Hydroplus™ 504	Ranked in Group 4 - also due to hazard associated with DMSO <sup>14</sup>
Graffiti Towels #1447	Ranked in Group 4 – not randomly selected
Mötsenböcker's Lift Off®#5	Decided not to test as it was discovered that the product is marketed more for removing latex paint and this project was focused on removing a wider variety of graffiti types.
Magic Jell Graffiti Remover	Company not able to send product sample.
Mineral Spirits	Product sample not obtained, used in analysis for rating comparison only as it is a common “generic” product used to remove graffiti.
Misty® Vandalism Mark Remover	Ranked in Group 5
PGR®	Ranked in Group 5
RemovAll™ 310	Ranked in Group 4 – not randomly selected
RemovAll™ 400	Ranked in Group 4 - also due to hazard associated with DMSO <sup>14</sup>
SoyPower™ (aka SoyClean®)	Not enough ingredient information made available – it was not included in the analysis and ranking.
Superco Graffiti Buster	Ranked in Group 4 – not randomly selected
United 126, 526, and 826	Ranked in Group 4 – not randomly selected
110 VMR	Ranked in Group 4 – not randomly selected
Zep Erase®	Ranked in Group 5
Zep® Write Away	Ranked in Group 4 – not randomly selected

<sup>13</sup> After completing the product performance-testing phase it was discovered that Lift>It is being discontinued by TAP Plastics for unknown reasons.

<sup>14</sup> DMSO = Dimethyl Sulfoxide. Refer to the “Related Findings – Dimethyl Sulfoxide” section under Phase I Results in the main body of this report.

**APPENDIX V: PHASE II — GRAFFITI REMOVER FIELD TEST RESULTS OUTLINE**

Product	Hazard Ranking	Graffiti Type and Surface		Ease of Use/Notes
		Most Effective on...	Less Effective on...	
Enviro-Solutions™ Graffiti Remover	1	M, L, S: unpainted & painted smooth surfaces	S: concrete	Overall a nice product to use. It is a viscous liquid that is wiped onto surface; thus it is less likely to run. It works well on most hard smooth surfaces and most graffiti types. The need for the product to sit on surface for a period of time depends on the graffiti type and surface; in some cases letting it sit for 3-5 minutes was more effective, in other cases the product worked immediately. Also, in some cases surface paint would be disturbed, in other cases, not (surface more likely affected by the use of the scrub pad). On concrete surfaces it often faded the graffiti, but did not completely remove it.
SOYsolv®	1	M, L, S: unpainted & painted smooth surfaces	S: painted concrete, wood	Product is applied via trigger-spray. Overall a good product to use, although it has a strong smell. Product seems to work well on painted/unpainted smooth surfaces without smearing surface paint much – depending on type of graffiti. It was also effective on concrete painted stucco, to the extent that it removed most of the spray paint but leaving some shadow. When applied to wood, it dulled/smearing the graffiti, but did not completely remove it. With the concrete and the wood, it may have performed better if followed by a pressure washer rinse. The product seems to perform better if it has a chance to site for 3-5 minutes, but this was not always necessary.
BG-Clean™	2	M, L, S: unpainted & painted smooth surfaces		Product is applied via trigger-spray. Product worked well on marker graffiti on smooth surfaces – otherwise, its performance varied. In general, did not seem to affect surface except to some extent when using scrub pad – especially if a lot of scrubbing was required. Product seemed akin to working with soapy water.
Lift>It <sup>15</sup>	2	M, L, S: unpainted & painted smooth surfaces		Product is applied via trigger-spray. Seems to work well on most painted/unpainted smooth surfaces. In some cases, surface paint would be disturbed, in other cases, not. A bit smelly.
Taginator®	2	S, L: unpainted brick, concrete, and wood	S: painted concrete, metal	Product is applied via trigger-spray. It works remarkably well on unpainted brick and concrete surfaces, especially on “newer” brick that is relatively smooth and less porous (in which case it almost works instantaneously). On more porous brick and concrete some scrubbing with a stiff brush and water rinse is required. Some brushing may be avoided if able to use power washer. Product is not as effective on painted surfaces, as it removes surface paint too much. One setback: it has a very strong odor.
Lift Off® #3	3	M, L, S: painted and unpainted metal, unpainted plastic	S: painted concrete	Product is applied via trigger-spray. Worked fairly well on unpainted metal and plastic. Had to be careful with painted surfaces – as many times it easily removed surface paint. On painted concrete, it dulled spray paint, but did not remove completely. Product is also marketed for removing graffiti on fabric, but a fabric surface was not tested.

**KEY:**  
**Graffiti Type**  
M=markers  
L=lipstick and correctional fluid  
S=spray paint

**Notes**

- Most products displayed difficulty removing old (long-standing) spray paint.
- As the above table suggests, the field-testing was conducted to test products on the surface and graffiti types it would most likely be used for. Thus, it is not intended to represent *all* types of scenarios a user could possibly encounter.
- If a graffiti type and/or surface type is not listed, then the product was not tested on the surface or graffiti type.

<sup>15</sup> After completing the product performance testing phase, it was discovered that Lift>It is being discontinued by TAP Plastics for unknown reasons.

**APPENDIX V: PHASE II — GRAFFITI REMOVER FIELD TEST RESULTS OUTLINE (CONT'D)**

Product	Hazard Ranking	Graffiti Type and Surface		Ease of Use/Notes
		Most Effective on...	Less Effective on...	
Lift Off®#4	3	M, L, S: painted and unpainted metal, painted plastic	M, S: painted concrete, brick, wood	Product is applied via trigger-spray. Worked fairly well on unpainted metal. Had to be VERY careful on painted surfaces, as most of the time it easily removes surface paint. On porous surfaces it seemed to dull the graffiti, but did not remove completely – perhaps product would have been more effective combined with pressure washer rinse.
Tagaway®	3	M, L, S: painted and unpainted smooth surfaces	S: painted concrete	Product is applied via trigger-spray. Product works okay on most smooth surfaces. In some cases, surface paint would be significantly disturbed, in other cases not. Somewhat effective on painted concrete stucco, but required a lot of scrubbing and it left some graffiti shadow.
Graffiti-X	4	M, L, S: unpainted and painted smooth surfaces	S: wood	Product is applied via trigger-spray. Effectiveness varied on painted and unpainted metal surfaces – most of the time it worked well with some smearing of graffiti and/or surface paint, but other times it just smeared and would not completely clean off graffiti. Product did better on plastic surfaces, with minimal smearing or affect on surface. Overall though, it did not seem worth the additional hazard of using this product versus some of the “Group 1” products.
Lift-Away™Graffiti Remover	4	M, L: unpainted metal and plastic	M, S: painted concrete, metal, plastic	Product is applied via aerosol can. With the exception of unpainted smooth surfaces, the product did not perform very well. Especially on painted metal surfaces, the product often left a sticky residue and smeared graffiti and surface paint without much removal.
Lift-Away™Graffiti Towels	4	M: unpainted and painted plastics	L: painted metals	Overall, a convenient option, especially for removing pen/marker on smooth plastic surfaces. On such surfaces, it did not seem to affect the quality of the surface.
Vandal Ender™	4	M, L: unpainted smooth surfaces	M, L: painted metal	Product is applied by wiping on surface. Product worked fairly well on unpainted surfaces; less so on painted surfaces as it often significantly smeared surface paint. Product is a bit smelly.



### California Proposition 65

Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted as a ballot initiative in November 1986. The Proposition was intended by its authors to protect California citizens and the state's drinking water sources from chemicals known to cause cancer, birth defects or other reproductive harm, and to inform citizens about exposures to such chemicals. Proposition 65 requires the governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity: [www.oehha.org/prop65/prop65\\_list/Newlist.html](http://www.oehha.org/prop65/prop65_list/Newlist.html)

### Indiana Relative Chemical Hazard Score (IRCHS)

The Indiana Relative Chemical Hazard Score (IRCHS) ranks the hazard potential of chemicals based on a scale from 1-100. For further information on IRCHS, go to [www.ecn.purdue.edu/CMTI/IRCHS/](http://www.ecn.purdue.edu/CMTI/IRCHS/).

### Janitorial Products Pollution Prevention Project (JP4) Chemical Hazard Ranking

JP4 classifies hazardous ingredients into four groups: Use Routine Care, Use Extreme Care, Avoid if Possible, and Do Not Use. The following further explains these categories. For more information on JP4, go to [www.westp2net.org/Janitorial/jp4.htm](http://www.westp2net.org/Janitorial/jp4.htm).

- *Use Routine Care:* Some of these ingredients are dangerous, but risks of them getting into the body to do harm are relatively low. For example, several of these ingredients have to be eaten in order for toxic effects to be felt. Others are toxic only at concentrations and quantities that are much higher than occur in janitorial products. As with any chemical, assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of leftover product, wastewaters, and empty containers.
- *Use Extreme Care:* These ingredients are dangerous, but may have to be used because safer substitutes are not readily available. Assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of leftover product, wastewaters, and empty containers.
- *Avoid if Possible:* If at all possible, avoid janitorial products with these ingredients. They pose very high risks to the janitor using the product, to building occupants, or to the environment. If there are no substitutes available and the products must be employed, then assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Use the product away from building occupants. Also take care when disposing of leftover product, wastewaters, and empty containers.
- *Do Not Use:* Janitorial products with these ingredients should not be used. They pose unacceptable risks to the janitor using the product, to building occupants, or to the environment. Gloves and goggles may not be enough to fully protect the user from harm. In some instances the ingredients are illegal for janitorial use.

### U.S. EPA Design for Environment Program (DfE)

The Design for the Environment (DfE) program is one of EPA's premier partnership programs, working with individual industry sectors to compare and improve the performance and human health and environmental risks and costs of existing and alternative products, processes, and practices. For more information on DfE, go to [www.epa.gov/opptintr/dfe/](http://www.epa.gov/opptintr/dfe/).

### U.S. EPA PBT Profiler

The PBT Profiler was designed to help interested parties voluntarily screen chemicals for persistence, bioaccumulation, and aquatic toxicity characteristics when no experimental data are available. The PBT Profiler uses a subset of P2 Assessment Framework computer-based tools to help identify chemicals that potentially may persist, bioaccumulate, and be toxic to aquatic life, i.e., PBT chemicals: [www.pbtprofiler.net](http://www.pbtprofiler.net).

The following lists are not intended to be definitive; they are only intended to serve as starting points for general inquiries on known and potential hazards of commonly used chemicals or products.

### Online Information

- **California Proposition 65** – Proposition 65 requires the governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity: [www.oehha.org/prop65/prop65\\_list/Newlist.html](http://www.oehha.org/prop65/prop65_list/Newlist.html)
- **ChemFinder** – Chemical input retrieves broad information on the chemical, including various names, chemical formulas, regulation information, links to information on health concerns, etc.: <http://chemfinder.cambridgesoft.com/>
- **Chemical Backgrounders** – Background information on over 100 chemicals compiled by the National Safety Council: <http://www.nsc.org/library/chemical/chemical.htm>
- **Eco-Labels** – The Consumers Union Guide to Environmental Labels: compare the validity and strength of various “green” labels/logos and find information about various certifying organizations: [www.eco-labels.org](http://www.eco-labels.org)
- **EPA Envirofacts Master Chemical Integrator (EMCI)** – link to a listing of chemicals that are monitored by EPA’s Major Program Systems: Air (AFS), Water (PCS), Hazardous Waste (RCRIS), Superfund (CERCLIS) and Toxics Release Inventory (TRIS): [www.epa.gov/enviro/html/emci/chemref/](http://www.epa.gov/enviro/html/emci/chemref/)
- **EPA Integrated Risk Information System (IRIS)** – IRIS is a searchable database (by chemical name) of human health effects that may result from exposure to various substances found in the environment: [www.epa.gov/iris/](http://www.epa.gov/iris/)
- **Green Seal** – Green Seal has product recommendations and standards for a variety of consumer products: [www.greenseal.org](http://www.greenseal.org)
- **Indiana Relative Chemical Hazard Score (IRCHS)** - The Indiana Relative Chemical Hazard Score (IRCHS) ranks the hazard potential of chemicals based on a scale from 1-100: [www.ecn.purdue.edu/CMTI/IRCHS/](http://www.ecn.purdue.edu/CMTI/IRCHS/)
- **INFORM** – Cleaning for Health project/manual and Community Right to Know Information and links to other resources: [www.informinc.org/cfh\\_00.php](http://www.informinc.org/cfh_00.php)
- **Janitorial Products Pollution Prevention Project** – Ranks chemicals commonly found in janitorial products according to their health hazard potential: [www.westp2net.org/Janitorial/jp4.htm](http://www.westp2net.org/Janitorial/jp4.htm)
- **PBT Profiler** – Searchable database identifying materials that have the potential to display Persistence, Bioaccumulation and Toxicity characteristics: [www.pbtprofiler.net](http://www.pbtprofiler.net)
- **Scorecard** – Chemical Profile Searchable Database, provides information on known and potential hazardous characteristics of chemicals: [www.scorecard.org/chemical-profiles/](http://www.scorecard.org/chemical-profiles/)

### Contractor Services

- **Green Seal** – Green Seal is an “independent, non-profit organization that strives to achieve a healthier and cleaner environment by identifying and promoting products and services that cause less toxic pollution and waste, conserve resources and habitats, and minimize global warming and ozone depletion”: [www.greenseal.org](http://www.greenseal.org)
- **INFORM** – At INFORM they “believe that meaningful progress depends on a public that is well informed about environmental problems, on dialogue rather than confrontation, and on collaboration among business, government and communities to achieve lasting solutions”: [www.informinc.org](http://www.informinc.org)
- **Zero Waste Alliance** – ZWA’s objective is to “provide improved profitability, competitiveness and environmental performance through the development and implementation of practices that lead to the reduction and elimination of waste and toxins”: [www.zerowaste.org](http://www.zerowaste.org)

APPENDIX VIII: FIELD TEST PICTURES



Before and after using Enviro-Solutions™ Graffiti Remover, letting sit about three minutes, and wiping off with towel.



Before and after using SOYsolv®, letting sit for about three minutes, and wiping with a scratchless scrub pad.



Before and after using Tagaway® and scrubbing with a scratchless scrub pad.

APPENDIX VIII: FIELD TEST PICTURES (CONT'D)

Before and after using Taginator<sup>®</sup>, letting sit for about 10-15 minutes, scrubbing with a stiff brush, and rinsing with water from a trigger spray bottle. Would most likely have removed old green paint residue if power washer had been used for water rinse.



Before and after using Enviro-Solutions<sup>™</sup> Graffiti Remover, and wiping off with towel — did not let sit.



All photos by Stacey Stack