Article 140

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Pollution Prevention for Auto Recyclers

Auto recycler facilities are important sources of pollutants entering stormwater. Swamikannu (1994) shows how the use of stormwater management practices and pollution protection techniques can decrease the concentration of pollutants present in stormwater runoff from these facilities. An auto recycler facility or scrapyard is one where old and wrecked cars are collected, stripped of their parts, and transported so that metals—and to a lesser extent, plastics, fluids, and other materials—can be recycled. There are more than 20,000 such facilities in the United States, with an average size of 7.4 acres, each processing a mean of 439 vehicles per year.

Auto recycling facilities have the potential to be hotspots of stormwater pollutants for several reasons. First, industry surveys indicate that over two-thirds of the sites store vehicles outside, where they are exposed to rainfall. Second, less than 20% of all facilities drain fluids from vehicles before they are stored. This is critical, as each can contain nearly four gallons of automotive fluids (waste oil, antifreeze, and hydraulic fluid), as well as other pollution sources (filters, tires, and brakes), few of which are reclaimed or recycled (Table 1). Lastly, very few scrapyards are equipped with practices for containing stormwater runoff before it exits the site.

Table 1: The Anatomy of a Scrapped Vehicle (Swamikannu, 1994)

Component	Unit	Reclaimed/ Recycled
Tires	5	SELDOM
Batteries	1	SELDOM
Antifreeze	1.9 gal.	SELDOM
Waste Oil	0.75 gal.	LESS THAN 40%
Hydraulic Fluid	1.1 gal.	LESS THAN 40%
Filters	4	NO
Brake Pads	1 lb.	NO
Steel	1,620 lbs.	YES
Iron	420 lbs.	YES
Glass	80 lbs.	SELDOM
Plastic	200 lbs.	SELDOM
CFCs	0.5 lbs.	SELDOM

Swamikannu investigated the quality of stormwater runoff at a 17-acre auto recycling facility in Los Angeles, CA, that processes over 16,000 vehicles each year. Composite samples were collected for over 40 storm events for various parameters (Table 2). Clearly, auto recycling facilities do represent a hotspot in the urban landscape, as they typically can have higher concentrations of oil/grease, phenols, BOD, metals, and some priority pollutants compared to other sources (Table 3).

The key question is whether the elevated concentrations are toxic to aquatic life. Swamikannu used bioassays of fathead minnows (*Pimephales promelas*) to test for acute toxicity in stormwater from 49 storm events at the Los Angeles facility. Prior to implementation of stormwater practices at the site, most of the bioassays indicated that runoff was indeed acutely toxic (defined here as 20% or more mortality of the minnows when exposed to stormwater). Statistical analysis suggested that three pollutants were responsible for much of the toxicity: copper, lead, and phenols.

The 10-year monitoring effort allowed Swamikannu to investigate the influence of structural and non-structural practices on controlling stormwater runoff at the site. The primary non-structural stormwater practice involved draining vehicle fluids prior to stripping. An early structural stormwater practice directed wastewater from a dismantling area through a multi-chambered oil-water (OW) separator. During the seventh year of the study additional structural modifications were made to the facility: a roof was constructed over the dismantling area, and the OW storage tank capacity was expanded. Following implementation of the stormwater practices, acute toxicity declined from 100% during the first year of the study to 14% during the final year. In addition, other pollutant concentrations, most notably oil and grease, declined (Figure 1).

A second auto recycler in Riverside County, CA, has implemented even more stormwater practices. Workers drain fluids into storage tanks before dismantling vehicles, and OW separators as well as an aeration-flocculation (AF) treatment system are used. The OW separators collect water from areas used for dismantling, storage, and display. The AF system, consisting of an equalization tank, a coagulating mixer, a settling tank, and an aerator, collects water from the vehicle storage area. Since it is somewhat smaller than the Los

Table 2: Characteristics of Stormwater Runoff From Auto Recycling Facilities (Swamikannu, 1994)

Pollutant (unit)	Detection frequency (%)*	No. of samples	Median	Mean
TSS** (mg/l)	100	50	140	335
BOD** (mg/l)	89	42	74	93
TP** (mg/l)	90+	58	0.11	23
TN** (mg/l)	90+	58	1.58	4.63
O/G (mg/l)	94	44	21	25
Phenols (µg/l)	77	44	30	57
Lead (µg/l)	84	44	111	182
Copper (µg/l)	93	44	90	103
Zinc (µg/l)	95	44	430	520
Cadmium (µg/l)	41	44	5.2	8.3
Chromium (µg/l)	54	44	7	21
Nickel (µg/l)	50	44	30	47
Mercury (µg/l)	12	45	0.09	0.29
Arsenic (µg/l)	49	43	3	5.5

* one-half detection limit substitution method
Note: benzene, ethyl-benzene, toluene, and xylenes also detected in stormwater runoff group samples.
** National study of Auto Recycling Association

Figure 57.1: Trends in the mean concentration of oil and grease in stormwater between 1984 and 1993

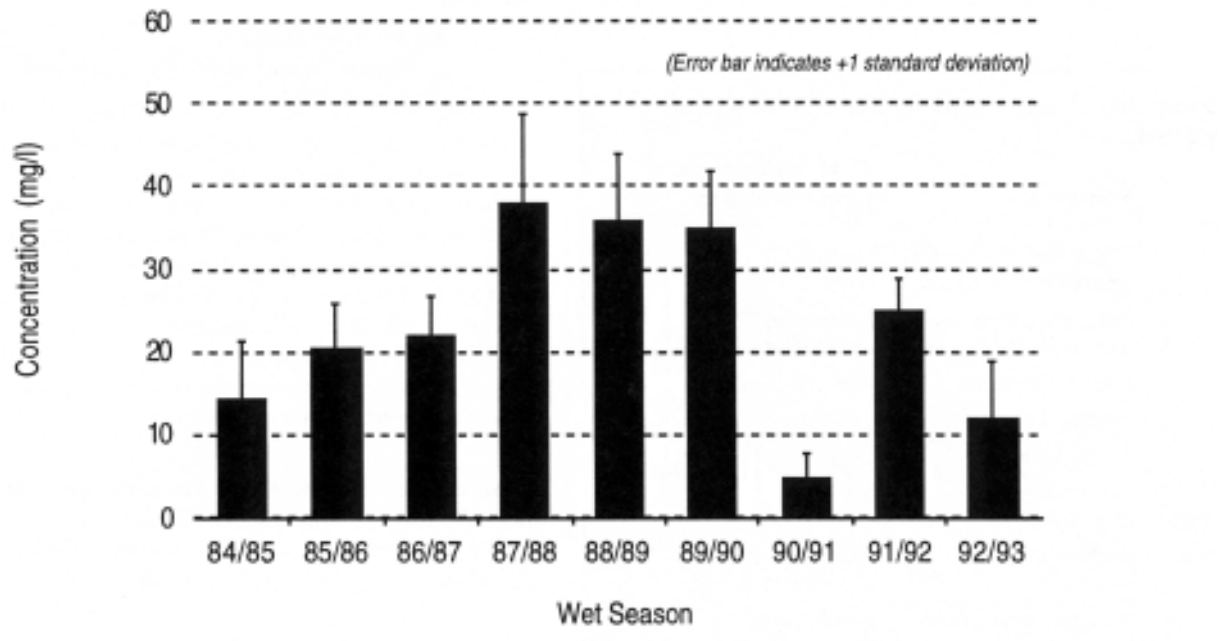


Figure 1: Trends in the Mean Concentration of Oil and Grease in Stormwater Between 1984 and 1993

Angeles facility (13 acres; in 1991 it processed a mean of 10,000 vehicles/year), the Riverside County facility was compared to a reference site of similar size and processing magnitude. This reference facility is located in Sacramento County, CA, and practices no stormwater treatment measures other than removing fluids prior to dismantling. After undergoing AF treatment, effluent concentrations of oil/grease and lead declined considerably to levels approaching the US EPA benchmark (Figure 2). This observation shows the effectiveness of multiple stormwater treatment systems.

Swamikannu's study shows that the selection of appropriate stormwater practices can make a significant difference in pollutant loads. In addition to the practices used in the test facilities he recommends several others (Table 4). Each can help improve stormwater quality, but draining fluids prior to dismantling, covering the dismantling area, and building a berm are the most inexpensive and maintenance-free approaches.

Still, additional studies are needed to further quantify the relative effectiveness of different stormwater practices. There are currently two types of auto recycler facilities: self-service (where customers take what they need) and service-counter (where employees remove the parts). Pollution prevention education targeted to both facility types is necessary. Programs designed for service stations can serve as models.

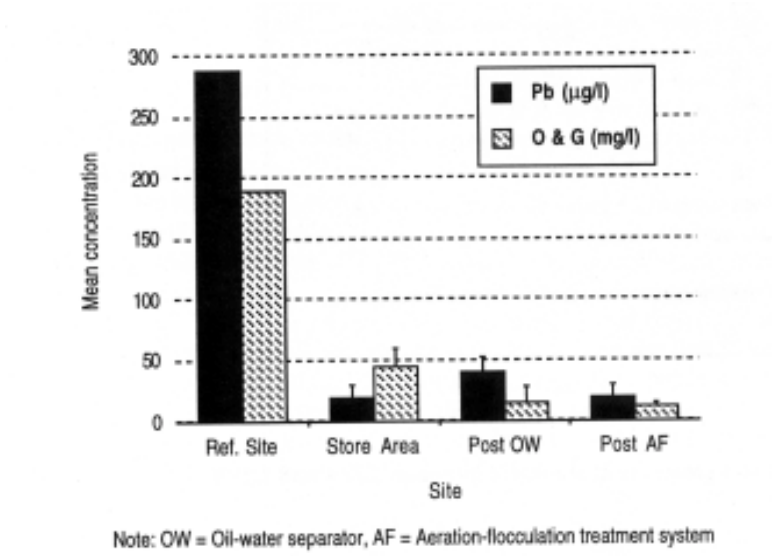
—GRR

References

Swamikannu, X. 1994. *Auto Recycler Facilities: Environmental Analysis of the Industry With a Focus on Stormwater Pollution*. Ph.D. Diss. University of California, Los Angeles.

Table 3: Median Values of Runoff for Selected Sites (Swamikannu, 1994)

Pollutant (mg/l)	Los Angeles facility	Highway (>30,000 vehicles/day)	NURP runoff
COD	N/A	114	65
Zn	0.430	0.329	0.160
Pb	1.110	0.400	0.140
Cu	0.090	0.054	0.034



Note: OW = Oil-water separator, AF = Aeration-flocculation treatment system

Figure 2: Effect of Treatment on Stormwater Concentrations of Lead (Pb), and Oil and Grease (O&G)

Table 4: Examples of Auto Recycling Facility Stormwater Practices (Swamikannu, 1994)

BMP	Function	Cost/maintenance Considerations
OW separator	Separates oils and grease from water	Maintain regularly
AF treatment	Separates pollutants from water	Expensive; maintain regularly
Sand/gravel filter	Filters pollutants	Replace sand frequently
Detention pond ment	Settles pollutants	Large space require-
Vegetative belt ment	Filters pollutants	Large space require-
Fluid drainage prior to dismantling	Reduces escape of pollutants	Inexpensive
Cover dismantling area	Reduces vehicle exposure	Inexpensive; low maintenance
Berm around dismantling area	Reduces flow across dismantling area	Inexpensive; low maintenance