To reduce the risks associated with dry blasting of lead-based paint, the Sonoma County Water Agency used a chemical stripper last fall to remove lead-based coatings from a steel water tank. Built in 1959, the six-million-gallon (22.8-million-liter) steel water storage tank is 40 ft (12 m) high and 160 ft (48 m) in diameter. The steel exterior had never been completely stripped of multiple layers of lead-based paint; in fact, the existing coatings measured between 10 and 12 mils (250 and 300 micrometers), says Bill Garcia, division manager for the contractor.

The tank is adjacent to a park and a lake, which are in continual use by area residents. The agency’s choice of chemical stripping was swayed by its concern about the danger of lead exposure to persons using the park and lake as well as the possibility of water contamination from the removal process, says Jim Thompson, who supervised the project for the Agency.

The project, part of an overall rehabilitation job, involved the chemical stripping of 40,000 sq ft (3,600 sq m) of exterior steel. Chemical stripping and recoating were completed in just under 5 weeks, from mid-September 1995 to the end of October 1995, says Garcia. It is the third in a series of water tank projects administered by the Agency where chemical stripping was specified for total removal of lead paint.

Garcia says that the agency’s choice of chemical stripping also resulted in substantial savings. According to Garcia, dry abrasive blasting with total containment, excluding labor and worker hygiene measures, would have cost $135,000, based on the following estimates.

- $25,000 for blasting materials;
- $60,000 for waste disposal (200 tons [272 megagrams] of contaminated abrasive at $300 per ton [$272 per megagram]);
- $40,000 for scaffolding and containment; and
- $10,000 per month for equipment for negative air pressure.

Chemical stripping, excluding labor and hygiene measures, ended up costing $57,475.

- $29,500 for the stripping material;
- $17,875 for disposal of 65 barrels of hazardous waste.
- $2,700 for Department of Transportation boxes for hazardous waste;
- $3,600 for a worker lift; and
- $3,800 for tarping.

According to the manufacturer, the sodium hydroxide-based stripper is designed for the removal of lead-based paint from all types of metal structures. When used with a surface-tolerant coating, the stripper eliminates the need for abrasive blasting, the manufacturer says.

Garcia supervised the project, his first using a chemical stripper. Like many in the industry, he was somewhat skeptical. “Rule one in lead-based paint abatement is to minimize crew exposure, while keeping the lead from leaching into the surrounding environment,” notes Garcia. “I was interested in comparing the end result of using this chemical stripper to that of abrasive blasting.”

A 60-mil (1.5-millimeter) layer of the stripper was applied to the tank exterior using a specially adapted heavy-duty industrial sprayer. The thick alkaline paste adhered to the coated surface without slumping, forming a skin that allowed the stripper to dissolve the paint without drying out, reports Garcia.

The paste was left in place for approximately 24 hours and remained damp throughout, completely containing the lead paint. The chemical stripper was removed using large scrapers, and the surface was rinsed using a paint pump that delivered water at a rate of less than ¼ gal. (1 L) per minute. One application of the stripper removed the existing lead-based coatings.
paint down to the bare steel sub-
strate, says Garcia.

According to Garcia, only 2 minor
problems were encountered with
the stripper: it evaporated more
quickly than intended on the hot
roof of the water tower, and it had
to be brush-applied in multiple coats
to handrails to remove the coatings.
Garcia explains that the evaporation
problem was circumvented by cov-
ering the stripper with plastic sheet-
ing to ensure that it remained moist.
A plastic containment blanket was
placed around the tank’s perimeter
to catch debris and water from the
removal process. A berm was creat-
ed around the edge of the tarp to in-
sure that no water or debris would
be carried outside the containment,
says Thompson. The plastic sheeting
was rolled up and placed in 55-gal-
lon (209-liter) disposal drums. The
project generated 65 drums of haz-
ardous waste, which included the
rinse water, says Garcia.

According to Garcia, workers were
monitored for 1 week to measure
air-borne lead levels. No measurable
quantities of lead were detected.
Following the personal monitoring,
workers continued to wear respira-
tors fitted with high efficiency partic-
ulate air filters, gloves, and protec-
tive clothing. Decontamination trail-
ers and shower facilities, were,
however, deemed unnecessary be-
cause the workers’ protective jump-
suits were considered uncontaminat-
ed, says Garcia. Throughout the
abatement project, area air monitor-
ing for lead dust was also conduct-
ed. Again, no measurable quantities
of lead dust were detected, says
Garcia. Soil samples taken before
and after chemical stripping indicat-
ed no significant increase in lead
content, adds Thompson.

The entire tank surface was
cleaned to bare metal, says Garcia.
Although spot rusting was evident
before chemical stripping, only rust
stains remained after the coatings
were removed, says Garcia. Follow-
ning chemical stripping and rinsing,
the steel surface was checked for
surface pH to verify that all excess
alkalinity had been removed. It was
prime coated using 5 mils (125 mi-
crometers) of a surface-tolerant
epoxy mastic, eliminating the need
for abrasive blasting to impart a pro-
file on the steel. The prime coat was
followed by 2, 2.5-mil (62.5-microm-
eter) coats of acrylic. All coatings
were applied with spray equipment,
says Garcia. He says that the Son-
oma County Water Agency has anoth-
er 17 water tanks coated with lead-
based paint, all of which are
scheduled for chemical stripping.

Multiple Plant Services, Inc. (Ana-
heim, CA) performed the chemical
stripping and repainting. The chemi-
ical stripper is manufactured by Du-
mond Chemicals, Inc. (New York,
NY). Graco, Inc. (Minneapolis, MN)
supplied the industrial spray equip-
ment used for the application of the
chemical stripper.

ESD Urethane Cuts Maintenance Costs
in Electronics Plant

Silicon Graphics expects to save
at least $54,000 in maintenance costs
by using an electrostatic dissipative
(ESD) urethane system in its Sunny-
vale, CA, plant, says Jim Mullen,
an industrial engineer for the com-
pany. The application of the ESD
system over a 90,000-square foot
(8,100-square meter) concrete floor
was part of a plant-wide refurbish-
ment project. Spanning October
1995 to January 1996, the project
was conducted in phases to facilitate
other work.

To comply with ISO 9000 specifi-
cations, a European standard that
outlines requirements for the docu-
mentation of manufacturing processes,
the company had to install a conduction floor material in the
Sunnyvale facility, says Mullen. The
company had previously used an
ESD system comprised of non-con-
ductive tile and ESD wax in its
Mountain View, CA, manufacturing
plant. Although the initial installation
for this system is low—$1
per sq ft ($11 per sq m)—the associ-
ated maintenance is extremely ex-
pensive, says Mullen. The ESD wax
must be reapplied every 60 days to
maintain its properties, with more
frequent reapplication when produc-
tion increases. The facility requires
3 workers to continuously re wax the
floor, at $4,500 per month, says
Mullen. Another disadvantage of
the tile and wax system is that
production areas must be shut down
during the application of the ESD
wax, says Mullen, at an additional
cost to productivity.

Given its experience with the tile
and ESD wax system, the company
was eager to find a less expensive
alternative. At the contractor’s recommendation, the company chose the ESD urethane system, says Mullen. The flooring project began with the removal of existing tile. According to Mullen, the concrete in the 23-year-old plant was in surprisingly good condition, with only minor cracking. The contractor prepared the concrete with a centrifugal wheel blasting unit to impart a profile on the concrete and remove any vestiges of bond release agents from the surface. Because the plant sits atop a high water table, the contractor conducted moisture tests to measure the hydrostatic pressure exerted on the concrete. According to Ercell Ingram, a representative of the contractor, workers applied 6 moisture test kits consisting of a measured amount of absorbent under a sealed 7 in. by 10 in. (18 cm by 25 cm) plastic dome, and allowed it to stand for 48 hours. The material was weighed again, which allowed the contractor to determine the pounds of moisture emitted per 1,000 sq ft (90 sq m) per 24 hours.

The contractor sealed the concrete floor with a three-layer moisture barrier system, consisting of a trowel-applied cementitious latex base coat, a liquid rubber intermediate, and a cementitious latex topcoat, says Ingram. The ESD system was applied by squeegee and roller, says Ingram, due to concerns about fumes and overspray within the facility.

First, a water-borne epoxy primer was applied at 2 mils (50 micrometers). A six-mil (125-micrometer) coat of a two-component epoxy resurfacer followed. Two coats of ESD urethane were applied at 3 mils (75 micrometers) each.

Although the coatings presented no hazards to applicators or surrounding trades, the contractor applied the coatings in the evenings to avoid complaints from other trades about paint fumes, Ingram says.

Once applied, the ESD system underwent resistivity tests for ESD certification, says Mullen. Twenty-four electrical readings are taken over 4,000-square foot (372-square meter) areas to ensure that the coating’s electrical resistance ranged between $10^6$ and $10^8$ ohms per sq ft ($10^7$ and $10^9$ per sq m).

According to Mullen, the ESD urethane system cost approximately $4 per sq ft ($43 per sq m) to install. The coating manufacturer predicts a service life of 10 years. Mullen says that even 6 years of service will save approximately $54,000 compared to the tile and wax system.

Tera Lite Inc. (San Jose, CA) applied the ESD urethane system. Crawford Laboratories (Chicago, IL) manufactured the coatings. JPCL