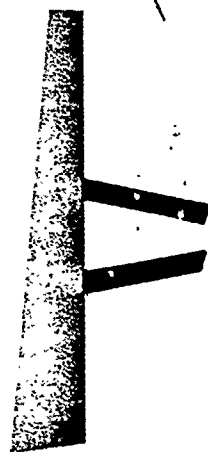


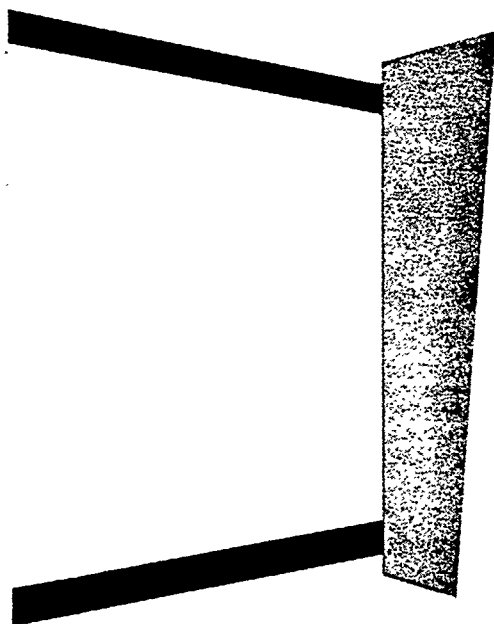
**PLAINTIFF'S
EXHIBIT**

ETCO-76

Pink



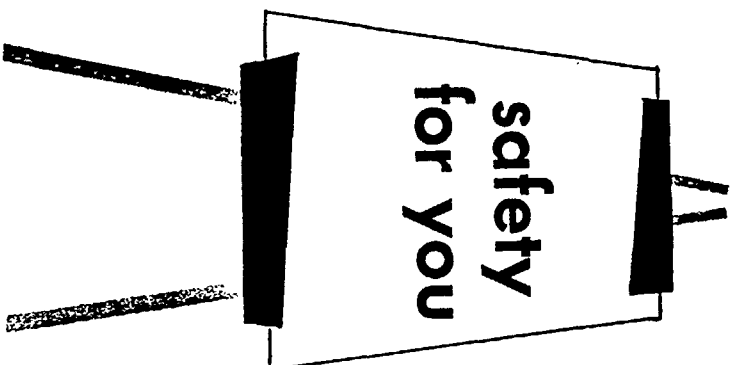
**safety
for you**



A service publication of
ETHYL CORPORATION
Product Service Department



This booklet is designed to help protect
you from any and all lead hazards
connected with cleaning tanks that have
contained leaded gasoline.



tank cleaning safety

Benefits of Safety

Any tank that has held leaded gasoline since it was last cleaned may offer a lead hazard.

This is true of all tanks—refinery, terminal, bulk and trackside.

It is true of all sections of the world, all sections of the country.

It is true in the winter and in the summer, the spring and the fall. And it is true in all weather, hot or cold, wet or dry, cloudy or clear.

In the face of this potential hazard, not one single workman has been harmed by lead when the *Ethyl safety precautions* were followed.

This booklet explains these precautions, gives the reasons for them, and demonstrates how to use them.

Hazards of Explosion

First, here's a simple way to review the hazards of explosion and fire when cleaning a tank that has held a petroleum product and how to prevent an accident:

This simple formula is easy to remember. The key word is **HAVE** standing for:

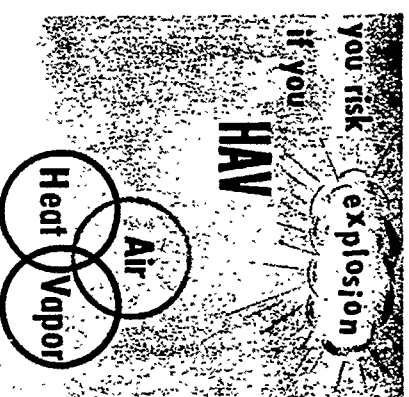
Heat—that's hot enough

Air—enough, but not too much

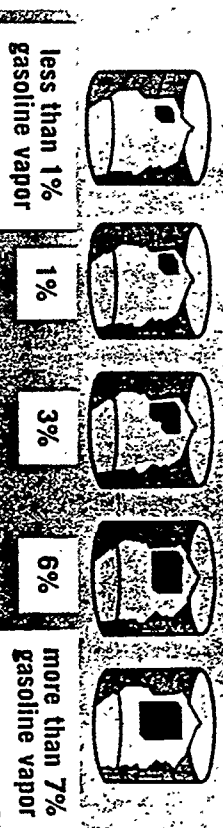
Vapor*—enough, but not too much
Explosion

The trick is to see that the first three are never present in the tank at the same time. Remove either the H, the A or the V and you automatically remove the E.

*Petroleum Vapor.



Heat - hot enough
Air - enough but not too much
Vapor - enough but not too much

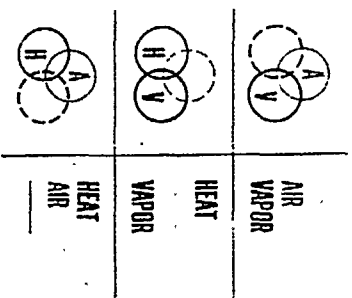


The five drawings above show what kinds of mixtures are dangerous.

he one on the far left is "too lean", be hazardous—it contains less than 1% vapor and more than 99% air. The one on the far right, on the other hand, is "too rich" to be hazardous—it contains more than 7% gasoline vapor and less than 93% air.

The three in the middle are the ones to watch out for—the ones that represent the explosive range—mixture of 1 or 2% gasoline vapor, or 3 or 4%, or 5 or 6% ... and the rest air. The one in the center, with 3% gasoline vapor and 97% air is right in the middle of the combustible range. Any source of ignition could touch it off.

So much for the conditions that can lead to an explosion or fire. Let's look now at the other side of the picture—how to prevent the combinations of conditions that mean danger.



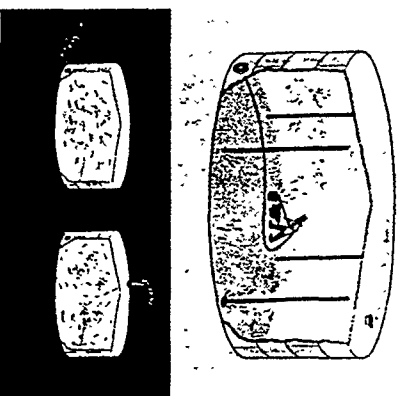
These three drawings represent tank conditions that cannot cause an explosion.

The top combination represents a hazardous mixture of air and vapor (approx. 1% to 7% vapor): But since no heat of ignition temperature is present, the tank cannot explode.

The second combination represents a "too rich" tank. There is heat that's hot enough. There is vapor—but too much of it (more than 7%). There just isn't enough air in it, so it can't explode.

And the third combination represents a "too lean" tank. Again, there's enough heat, and air—but the vapor is less than 1% ... not an explosion hazard.

BUT A TANK THAT IS "TOO LEAN" SOMETIMES GETS RICHER.
AND A TANK THAT'S "TOO RICH" SOMETIMES GETS LEANER.



This illustration shows how. At top, a "too lean" tank is getting richer—gasoline vapor is escaping into the tank from the sludge and from a break in the hollow roof support. At the bottom are two examples of the opposite—a tank that's "too rich" becoming leaner.

In the tank at left, vapor is escaping from an open manhole. An ignition source outside the tank could touch it off as the vapors thin out into the just right mixture in the air outside.

The tank at right is being vented—and as the vapor content inside the "too rich" tank gets lower, the tank must go through the explosive range.

To go back to our simple formula—H for heat, A for air and V for

vapor—the E for explosion, you will have the complete formula—an explosion when you have ignition heat, approx. 93% to 99% air, and approx. 7% to 1% gasoline vapor.

Preparations for Cleaning

Before the manhole cover is taken off any tank—there are certain basic checks that must be made. Is the area around the tank free of any possible source of ignition? Is the tank itself in good condition? Is the wind blowing directly from this tank onto other men working nearby? Is a storm coming up? Are all lines disconnected and blanked off with suitable blinds? (*Never rely on the valve.*) Has the tank contained leaded gasoline?

CHECK before you start to clean:

- ☐ area free of ignition source?
- ☐ how much sludge?
- ☐ what is condition of tank?
- ☐ weather, ok?
- ☐ wind direction at start?
- ☐ lines all disconnected?
- ☐ has tank contained leaded gasoline since last cleaning?
- ☐ will it return to leaded use?

and perhaps most important: is that "empty" tank *really* empty? Any tank that has been lying idle may have contained liquid gasoline that now has vaporized—creating a hazard.



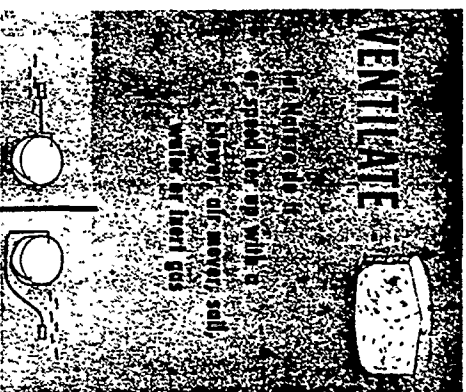
is that empty tank
EMPTY?

And don't forget that you can't tell if a tank is empty just by looking.

FIRST
get rid of liquid gasoline

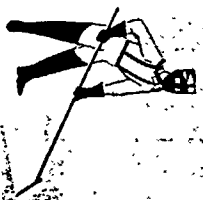
by stripping
by floating
or by washing

The first step in cleaning a tank, of course, is to get rid of liquid gasoline.



But even before this actual work begins, begin ventilating the tank—start getting rid of gasoline vapor—just as soon as the manhole is opened.

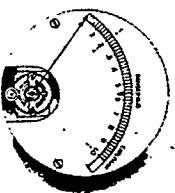
don't bother with your
Combustible-gas Indicator
till all the liquid gasoline
is GONE



One of the things to remember about gasoline vapor is that it is heavier than air, and tends to hug the ground. You can let Nature do the ventilating, by leaving the manhole cover off. But a faster method is to use a blower or air mover at the top manhole. It's sure, too, because when forced ventilation isn't being used, there are times when vapor escaping from the bottom manhole could cause a hazardous condition around the tank. The ventilating process should be kept up continuously while the work of cleaning is going on—until the tank has been thoroughly cleaned and tested.

The Combustible-gas Indicator
Don't use the Combustible-gas Indicator during stripping or cleaning, or whenever any liquid gasoline is present because there will be vapors in the tank—so any reading on the combustible-gas indicator will be of little value.

Combustible-gas Indicators
are delicate instruments



After all liquid gasoline has been removed, the Combustible-gas Indicator is brought into play. The Indicator, it should be emphasized, should be used, tested and cared for only by a man who understands it.

A green reading on a Combustible-gas Indicator in a gasoline tank means that the tank is safe as far as fire and explosion is concerned at the time the check is made. To be really safe, wear air line respiratory protection until all the sludge has been removed from tank and a test has been made.

API and many petroleum companies recommend that no one enter a tank until it is safe from the fire and explosion hazard. This means that *all* liquid gasoline is removed and the tank ventilated.

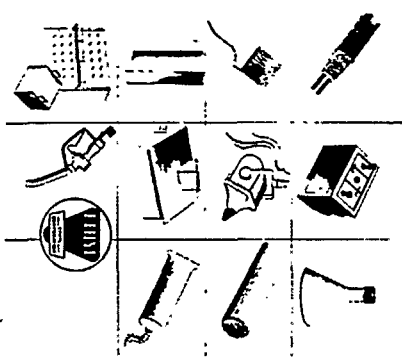
Hazards of Lead
Now, we come to the most important question of all—"is a vapor safe tank lead safe, too?"

**"is a
vapor safe
tank
LEAD safe
too?"**

The answer to that one, of course, is NO. A vapor safe atmosphere in a tank is an atmosphere you may breathe in—*provided there's no lead in that atmosphere*. With every bit of gasoline vapor removed from the tank, there may well be LEAD VAPOR in the air throughout the tank if that tank has held leaded gasoline. So the safest thing to do, regardless of whether a tank is vapor safe or not, is to assume that it is not lead free.

A few of the basic facts about lead...

LEAD can be a protector



manufacturing and testing, and protection against knock in gasoline engines.

LEAD could hurt
if you breathe it
swallow it
or get it on your skin

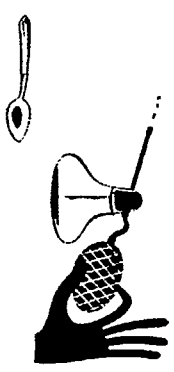
But lead can hurt—particularly in some form the human body can absorb easily, such as tetraethyl lead. It could hurt if you breathed it, swallowed it or got some on you. The tetraethyl lead in "Ethyl" fluid raises the antiknock quality or octane number. It provides refiners with a flexible, economical means of improving finished gasoline.

"can our tank cleaning crew keep
safe from **LEAD**?"

Lead's main function is probably that of the Great Protector. It's used as protection in electric cable sheathing, in storage batteries, as a lining for chemical containers, in protective coatings of paint, in X-Ray machines, in pipes, as red lead to protect steel surfaces, as roofing, as a squeezing tube, in atomic bomb

As this booklet stated at the outset: not one lead accident has ever happened anywhere when Ethyl's recommendations were followed. Now, to get an idea of the dangers of lead, consider this:

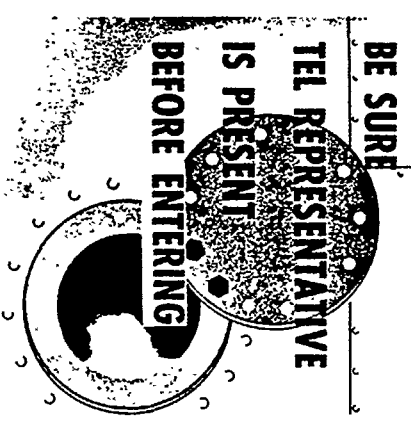
LEAD VAPOR



A man going into an empty 55,000-barrel tank with a perfume atomizer and spraying one-half teaspoon of tetraethyl lead into the air in that tank, would make the resulting mixture of lead vapor and air unsafe to breathe.

It can be readily recognized that the steps necessary to make a tank lead safe are more complicated than the steps needed to make it vapor safe.

An important step, of course, is to make it explosion safe—by following the check-list previously reviewed. But, to make a tank lead safe, it is vitally important to call in your TEL expert even before the first entry

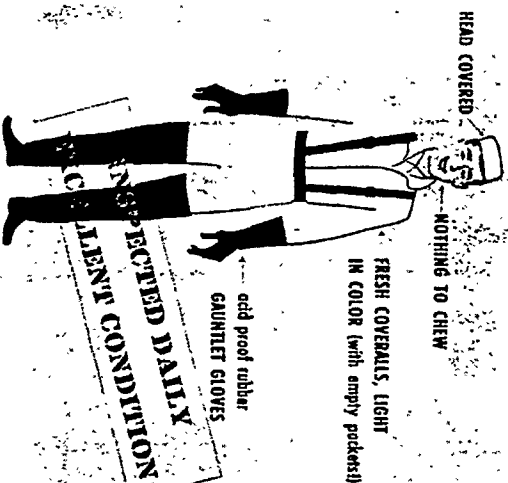
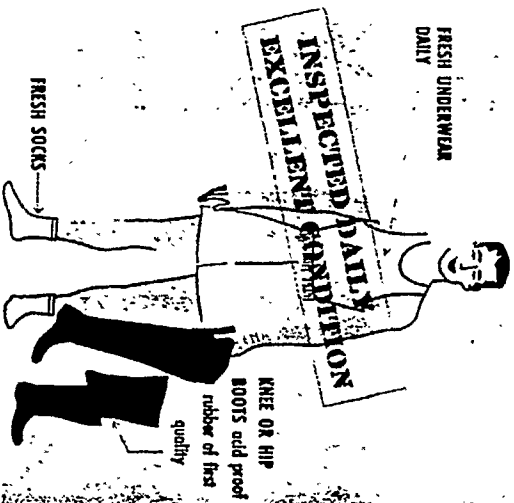


into the tank is made. He won't test for lead safety that first day—for he knows that lead vapor is there. His job is to make sure that the man goes into the tank fully protected—*against lead*.

The Combustible-gas Indicator and the Lead Hazard

The Combustible-gas Indicator should be used only on the question of possible explosion danger—never on the question of whether to wear a mask when entering the tank. Of course, a mask will be worn—lead has been in the tank, and it will always be there until removed. *A mask is a MUST in doing any work in any tank that has held leaded gasoline... UNTIL THE TANK HAS BEEN MADE LEAD HAZARD SAFE.*

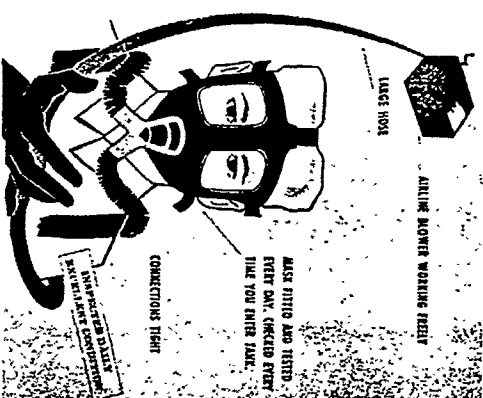
use the right equipment



Equipment

This means having the right equipment. Fresh underwear and socks must be put on every working morning. Wear boots and gloves of a material that is impervious to gasoline, water, and tetraethyl lead. (Acid-proof rubber is acceptable as impervious material.)

Wear fresh coveralls of light color so sludge spots can be seen. Your pockets should be empty. While wearing a mask nothing—such as gum or tobacco—should be placed in the mouth.

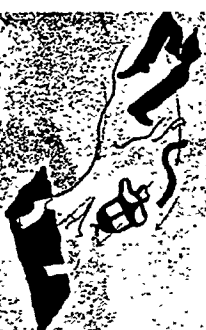


A small cap should be worn. Food and matches should not be taken to the tank site. Leave everything of this kind in the car or at the change house.

Now, protection is afforded from head to foot against any lead that could come into contact with the skin.

Have a blower-type hose mask, working freely, with fresh air being pumped in from the outside through a large diameter hose to the mask. The blower is located UP wind from the manhole to insure that the air supply is pure. The mask has to be checked for a snug fit every time it is put on for tank entry. Hose connections must be tight, too. The hose should be at least 1" in diameter. Then, if somehow the blower should fail, enough air can be drawn through the hose into the lungs to enable a man to get out of the tank. A mask is tested by pinching the two flex tubes on the shoulders and inhaling. If the mask collapses when drawing a breath, there isn't any leak. One thing further, be supplied with plenty of clean rags. Be free with them. Use them and throw

**IF IN DOUBT
TOSS IT OUT!**

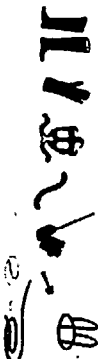


IN AN EMERGENCY, YOUR TEL REPRESENTATIVE
WILL SUPPLY EQUIPMENT

them in the sludge pit. See that used rags are never put in coverall pockets.

If any item of clothing is contaminated with sludge, remove it at once, wash the body carefully and put on fresh, dry clothing. If the condition of any item of clothing or equipment is questionable as to its condition, get rid of it in the sludge pit. This goes for masks, gloves, boots, hoses, coveralls, everything.

Most masks do not actually wear out—the rubber begins to get hard and nonpliable—stiff. Such masks have served their purpose. Toss them out. If tossing out equipment leaves you in a spot, check your Ethyl man—he may have the equipment to lend.

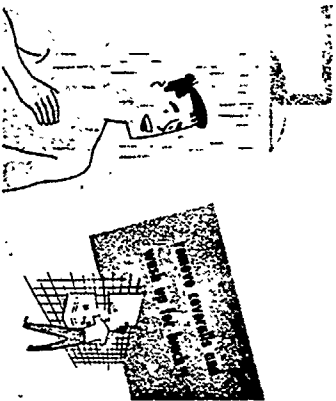


**all are washed daily
and again at end of job**



all are fresh daily

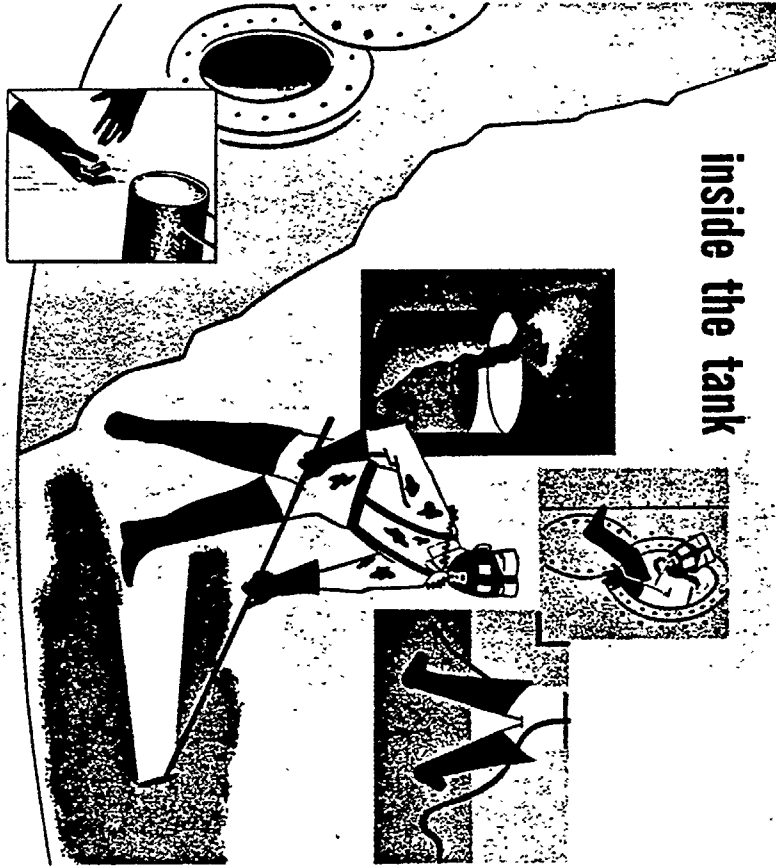
All equipment—boots, gloves, masks, harnesses, hoses, lifelines, shovels, buckets, scrapers, squeegees, brooms—should be washed at the end of each working day, and at the end of each tank cleaning job.



Not only change to fresh, clean clothing every day, but also a good, soapy shower should be taken at the end of the working day. These measures give added protection against contacting any lead accidentally. At lunchtime, every member of the crew should change from his coveralls and wash his face and hands thoroughly before eating.

safety procedures

inside the tank



Safety Inside the Tank

Illustrated on the previous page, are some of the conditions that mean danger in a leaded tank. In the illustration, the man at the top smells something—it makes no difference what. He does exactly what he should do—crawls out of the tank. He knows that something is wrong with his mask or hose, or with the source of air supply to the blower. He should keep out of the tank until the trouble is discovered and corrected.

The closeup at right shows a man being careful not to step over his own airline. Doing so would eventually get it tangled, and might kink or injure the hose. No good worker ever tugs his airline. He treats it with respect—his air supply and safety depend on it.

The closeup at left shows a sludge-bucket full. As full, that is, as it should ever be... namely, three quarters. That way it can safely be taken to and passed through the manhole.

The worker in the center has spilled sludge on himself. The only thing for him to do is to get out of the tank immediately, bathe, and change his coveralls.

And, as the picture at lower left shows, gloves should be washed on leaving the tank.

Safety Outside the Tank

Precautions are necessary, too, on the outside of the tank. Men should be cautioned against inhaling vapors escaping through the manhole to the outside — by staying UP-wind whenever possible.

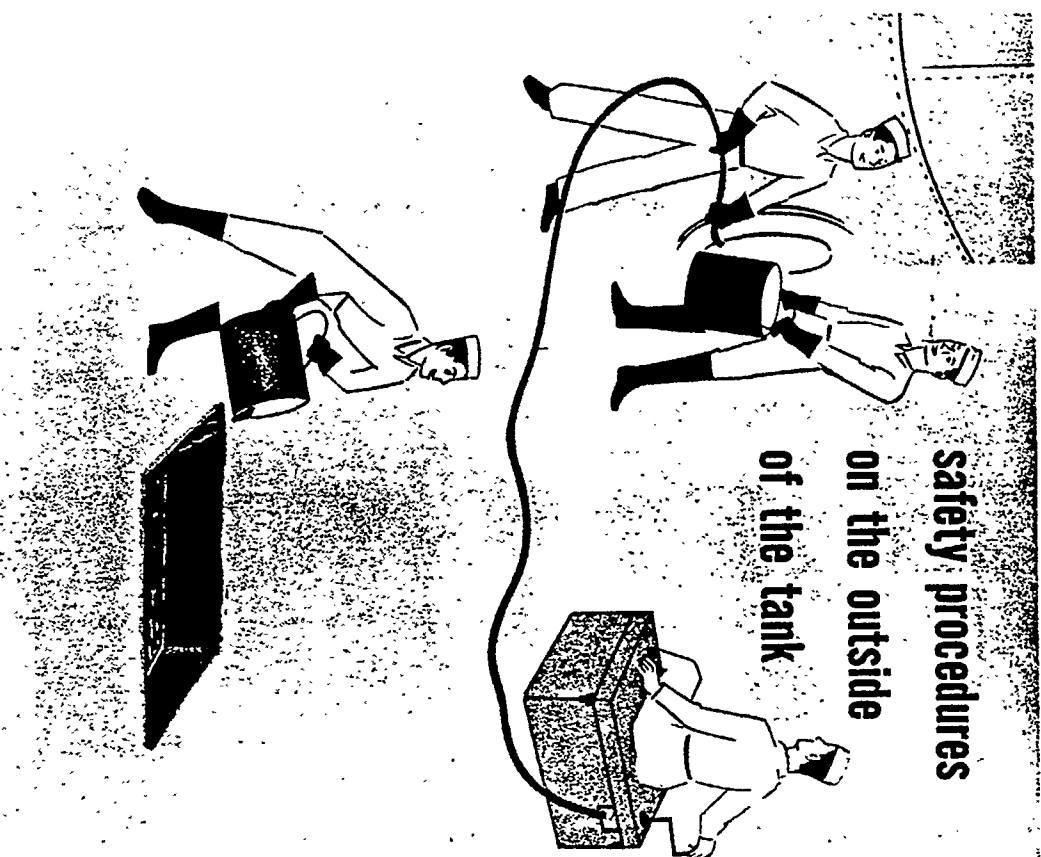
The men who carry sludge wear the full set of equipment, except for masks, and are subject to the same rules of clean clothes and bodily cleanliness.

The blower man and lookout man should always remain at their jobs, and have a substitute if for any reason they have to leave.

And if a man happens to spill some sludge on the ground outside the tank, it must be removed to the lead sludge pit for proper burial.

The lead sludge pit itself should be in a site where it is unlikely there will be any future digging. It should also be deep enough and large enough. If anything, make it too big. You can estimate how large it should be from the amount of sludge in the tank, but stay on the safe side: make it larger.

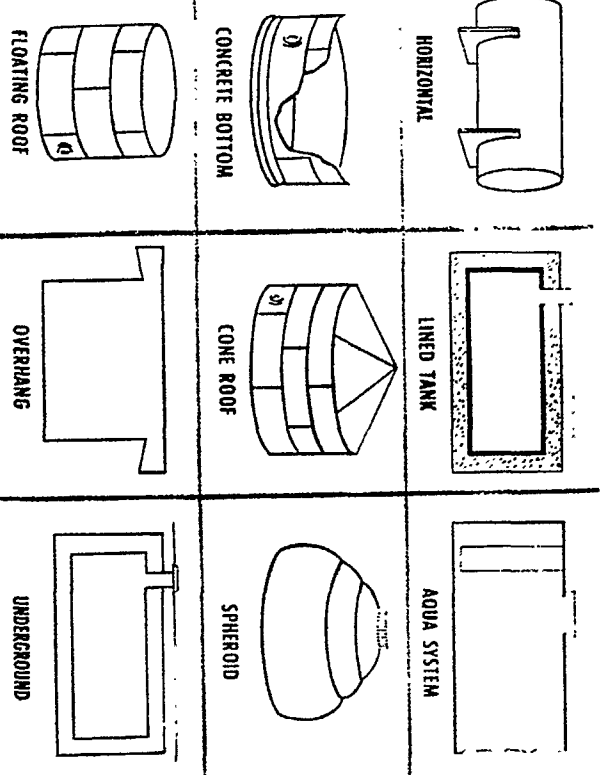
A popular idea shown in the illustration on the next page is to dig not one, but two, sludge pits—one a little lower and deeper than the other. With this system, the heavier particles settle in the first pit (left) and if the liquid still carries some sludge, it is contained in the second, or lower, sludge pit.



the lead sludge pit

A full foot of dirt should be thrown over all buried sludge. Enough additional dirt should be added to insure a level surface after settlement. Finally, the pit should be marked or mapped—or both.

types of tanks



For any type tank that is to be cleaned, your Ethyl man will be glad to supply the necessary information and recommendations.

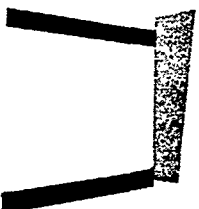
Major SAFE STEPS to be taken during a tank cleaning—follow these rules and you will be SAFE.

- Always wear proper clothing and equipment when entering a tank.
- Remove any sludge that gets on clothing or person.
- Keep the mask on while inside the tank.
- Come out of the tank if you smell anything.
- Always wear a mask in an uncleaned tank.
- *Don't* try to tell if lead is present by the color of the sludge.
- Keep the blower turning.
- Always watch the men in the tank.

Your Ethyl man is as close as your nearest telephone. If you have any questions, give him a call. His main concern is to get the job done well and safely.



**safety
for you**



ETHYL CORPORATION
100 PARK AVENUE, NEW YORK 17, NEW YORK

Litho. in U.S.A.

Formerly "Safety For Your Men" 158 REV.