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EC98-762 Farm*A*Syst Nebraska's System for Assessing Water Contamination Fact Sheet 6: Improving Petroleum Product Storage

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FACT SHEET 6

Nebraska's System for Assessing Water Contamination Risks

Improving Petroleum Product Storage

Petroleum product storage is an area of great concern for groundwater safety. It's not uncommon for fuel to leak into aquifers and pollute the drinking water of a family or even a community, and it can be very costly for the landowner. Petroleum product storage is regulated by laws regarding fire safety and air quality as well. Therefore, petroleum product storage must be evaluated from various perspectives. This fact sheet examines some important aspects of petroleum product storage: where the tank is located on your property, the type of tank, how to monitor the tank, reduction of losses from aboveground tanks, storage of lubricants, and how to close a tank.

1. Storage tank location

The most important aspect of your liquid petroleum storage tank location is how close it is to your drinking water well. Even though diesel fuel and fuel oil are more dense than gasoline and move more slowly through the soil, they can eventually reach groundwater. Thus, close proximity of petroleum storage to a well is a potentially hazardous practice.

How quickly the petroleum product reaches groundwater will depend upon local soils. Every site has unique geologic and hydrologic conditions that can affect groundwater movement. The more porous the soil (sands and gravels, for example), the faster the rate of downward movement to groundwater. Locate a new tank more than 100 feet away from your well to provide reasonable assurance that subsurface flow or seepage of contaminated groundwater will not reach your well. If possible, the tank should be located downslope from the well. *Figure 1* illustrates petroleum product seepage into soils.

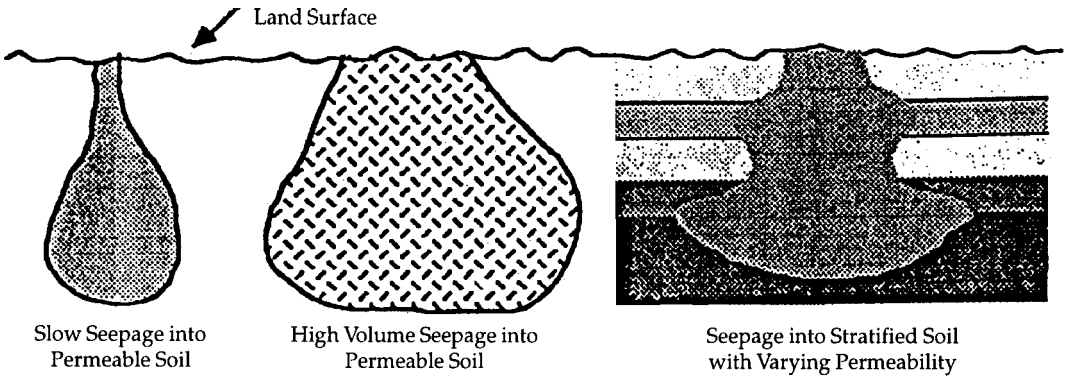

Figure 1. Petroleum product seepage into soils. Source: *Underground Tank Corrective Action Technologies, EPA/625/6-87-015,* January 1987.

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Tank placement regulations are generally more concerned with fire hazards. If you have an aboveground tank, follow existing regulations. To protect against explosion and fire, National Fire Protection Association (NFPA) code 395 requires aboveground tanks to be located at least 40 feet from buildings and other combustible structures such as haystacks. The tanks must also be labeled with "**Flammable - Keep Fire and Flame Away**" and "**Keep 40 Feet Away From Buildings."** There are many who believe that aboveground storage tanks for diesel fuel may be located next to a building. This may be due to observing heating oil tank installations. However, aboveground farm fuel tanks must be placed at least 40 feet from existing buildings (see *Figure 2*).

New storage tank location

Along with maintaining adequate distance from your drinking water well, choose a location for a new tank based on the following considerations:

- **Soil characteristics**. Highly corrosive clays, wet soils, cinders, and acid (low pH) soils can significantly speed up the rate of corrosion of underground metal tanks and piping. Using clean backfill during installation can decrease the negative effects of surrounding soils.
- **Soil stability**. Assess the ability of the underlying soil to support both underground and aboveground tanks. For special locations, such as hillsides, be sure to properly situate and anchor your tank so that it will be held firmly in place. Be sure that pipes cannot twist or break if the tank is bumped or disturbed.

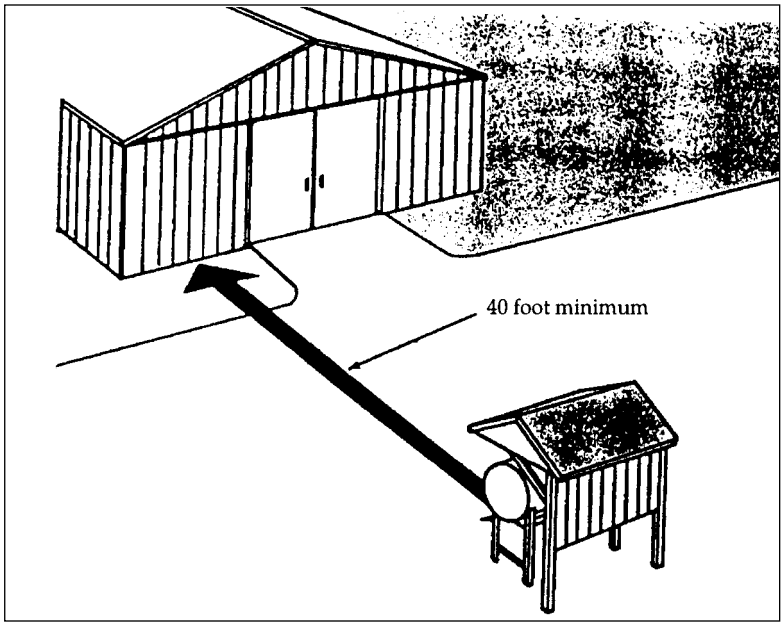

Figure 2. An aboveground gasoline storage tank must be 40 feet or more from the closest building.

Regardless of soil conditions, aboveground tanks that have a capacity of over 1,100 gallons are required to have a form of spillage control, such as a dike. If porous soil lies beneath a tank, the soil may have to be treated to make it liquid tight. Build a collection device for spills that has a sump for effective removal of spillage.

- **Current and previous land use**. Metals already in the ground at your chosen site will increase corrosion rates for the new tank. Avoid sites that contain abandoned pipes and tanks, agricultural drainage tiles, or waste materials.
- **Traffic**. Place your tank in the vicinity of the machinery and equipment storage buildings for convenience but with enough room around the tanks to maneuver farm equipment, personal vehicles and delivery trucks. Fifty feet on one side generally gives enough room for movement and maintenance. Protect piping from collisions with vehicles.

It is important to label your storage tanks, particularly if there are other fuels in the vicinity. This will help the fuel distributor to avoid mistakes in filling.

- **Depth to groundwater**. Waterways or areas where the water table is close to the surface are

poor locations for storage tanks. Tanks placed in such areas require special corrosion protection. To reduce pollution potential to groundwater, an aboveground tank may be preferable to an underground tank.

2. Tank design and installation

Whenever you install a fuel storage tank, carefully follow the manufacturer's recommended practices for installation. Proper installation is one sure way to minimize leaking potential of the tank or connecting pipe. Even scratches in a metal tank caused by careless installation can increase corrosion and tank deterioration.

Underground tanks

All underground tanks greater than 110 gallons must be registered with the State Fire Marshal—Flammable Liquid Storage Tank (FLST) Division at (402) 471-9465. It is illegal to reuse an underground tank for aboveground storage.

All new underground petroleum storage tanks and related piping must be properly designed, constructed, and protected from corrosion by the use of fiberglass reinforced plastic or cathodically protected steel. Methods of corrosion protection include interior liners and "sacrificial anodes," a special material connected to the tank that has a greater tendency to corrode than the tank material. The anode will typically protect the tank for up to 30 years. Virtually all corrosion occurs on the outside of the tank.)

Current corrosion research indicates that tanks and piping are most likely to corrode and fail in the first seven years. Testing should be done regularly. Testing of the tank and piping should be ongoing to ensure that the tank is not losing product into the surrounding soil and eventually into the groundwater.

Tanks installed prior to 1988 are required to have spill, overfill, or corrosion protection in place, or the tanks replaced by December 22, 1998 to be in compliance with Title 159, Nebraska Administrative Code and the Code of Federal Regulations (CFR), see 40 CFR, Part 280. Spill protection typically consists of a catch basin for collecting spills when the tank is filled. Overfill protection is a warning or prevention of an overfill such as an automatic shutoff or buzzer. Spill and overfill protection are important; they can prevent a number of small releases over a long period of time from polluting the groundwater.

Aboveground tanks

State regulations for aboveground tank installations seek to reduce the potential for both pollution and fire. To decrease pollution potential, place tanks within a secondary containment structure consisting of a dike and a pad. All piping should be aboveground and should go over the dike wall. Aboveground piping must be made of steel and coated to prevent corrosion. Any underground piping (outside of secondary containment) may be either steel or fiberglass, but steel must be coated and cathodically protected. A permit is required for personal use tanks for gas and diesel.

Shade and tank color make a substantial difference in the amount of evaporation loss from aboveground tanks of gasoline. Shade from a large tree can reduce fuel loss to evaporation by 75 percent compared to tanks placed directly in the sun, which lose substantial amounts if vapors are allowed to pass through an open vent. As noted in *Table 1,* the color of the tank influences the amount of loss. A tank painted a reflective color such as white or aluminum loses the least fuel. Another means of reducing the direct sunlight is to construct an open front shed over the tanks that opens away from the sun (see *Figure 3a*). The shed must have openings below the roof to allow heated air to escape.

Evaporation losses can be further minimized through the use of a pressure-vacuum relief valve. It can be used in place of a vented cap, or it can replace a separate vent. The tank must be air-tight for the valve to work, so if the valve is used to replace a vented cap and the tank has a separate vent, plug the vent.

To prevent corrosion of the tank, the tank must be supported at least 6 inches above the ground (see *Figure 3b*) using

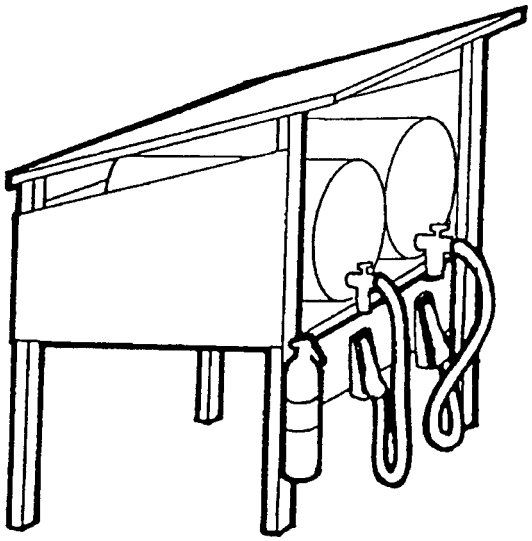

Figure 3a. A well-designed fuel storage shed. Note openings below roof to allow heated air to escape.

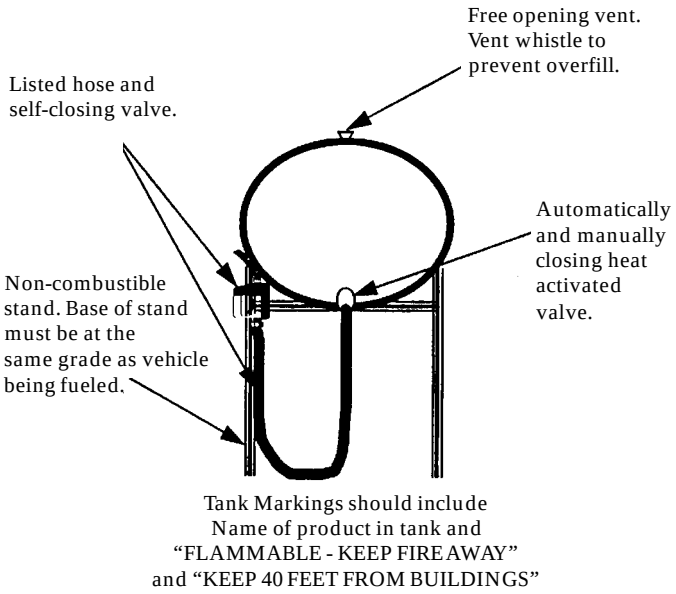

Figure 3b. Aboveground storage tanks elevated for gravity discharge (maximum size 1,100 gallons).

a well-built rack, timbers, or blocks.

3. Monitoring

Regulations require that all personal use underground tanks with a capacity of over 1,100 gallons have a method of detecting leaks. Select the tank location carefully to ensure ease of installation and reliability of chosen leak-detection methods. Test the tank periodically for leaks, and measure the tank inventory on a monthly (or more frequent) basis to help detect leaks before major problems develop.

Table I. Gasoline losses for a common 300 gallon (1,135 liters) tank differentiated by color of tank, presence of pressure-vacuum relief valve, shade, and placement underground. Source: ***Fuel Storage, NebGuide G81-560.***

	Representative gasoline losses	
Tank configuration	***Gallons/ month***	***Liters/ month***
Red tank in sun	9 to 10	34 to 38
White tank in sun	6	23
Red tank in sun with pressure-vacuum relief valve	5.5	21
White tank in sun with pressure-vacuum relief valve	3.2	12
Tank in shade	2.4	9
Tank in shade with pressure-vacuum relief valve	1.35	
Underground tank	less than 1	4

Since cleanup of gasoline leaks is always costly and often not totally effective, it is important to constantly monitor underground tanks containing petroleum products. If you already have a petroleum storage tank on your property, be aware of the age of your tank as well as the need to establish a leak-detection program. *Figure 4* shows a variety of options for proper underground storage tank monitoring practices.

Since most tanks used on farms, ranches and acreages are bare steel, tank corrosion or piping problems will cause leaks sooner or later. If your tank is more than 20 years old, or if you don't know its age, make a special effort immediately to determine whether leaks exist.

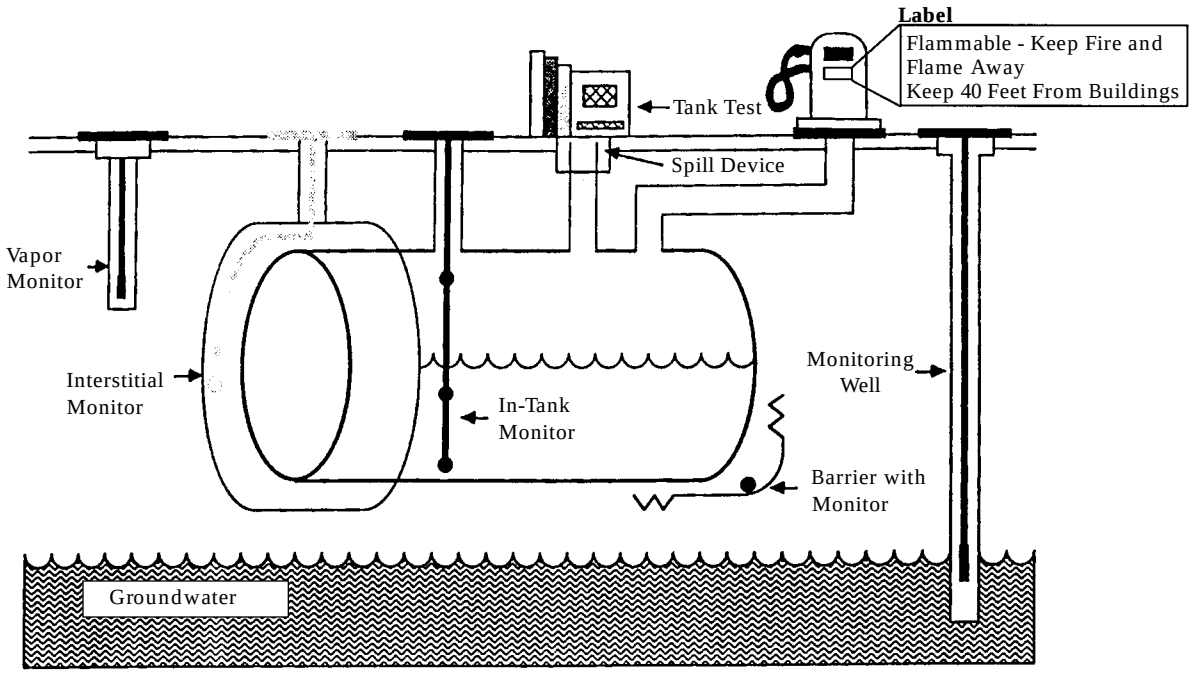

Figure 4. Leak detection alternatives.

Test tank integrity by such methods as precision testing / tightness testing and volumetric analysis. State regulations prohibit some other testing methods. Air pressure testing, for example, is prohibited if a tank has ever contained a product. You can request a list of approved tank testing methods and suppliers' phone numbers from the Nebraska State Fire Marshal—FLST Division at (402) 471-9465.

Even when a tank has been tested and proven tight, existing regulations and good practice require that you have a method for regularly detecting leaks.

Install such internal or external monitoring methods as groundwater monitoring wells, vapor monitoring, automatic tank gauging, or other approved methods.

Measuring tank inventories is an inexpensive and easy way to help detect leaks. Leakage is apparent when there is any decrease in level over time without any withdrawal of fuel or an increase in water in the tank. While inventory measurement will not detect very small leaks, it will at least provide a warning that further investigation is needed.

If a measuring stick is used to measure tank liquid level, be sure that the stick does not puncture or damage the bottom of the tank.

It is important to ensure that an adequate leak-detection system is in place to protect your water supply and that of your neighbors.

Leaks and spills

If you find a leak or spill from any tank—whether it be above or below ground, or even a vehicle-mounted tank—state law requires that you notify the State Fire Marshal and the Nebraska Department of Environmental Quality (NDEQ). You should also notify your local fire department or local emergency response people. Take whatever actions are necessary to remedy the problem according to recommendations you receive when you report the spill or leak.

The NDEQ administers the Petroleum Environmental Cleanup Fund, which can reimburse tank owners for a substantial percentage of costs incurred in cleaning up a problem for federally regulated tanks or home heating fuel tanks. For more information about the fund, call NDEQ at (402) 471-4230. Residential and farm vehicle fuel tanks with less than 1,100 gallon capacity

are not federally regulated and are therefore not eligible for this assistance.

4. Tank closure and removal

According to Title 159, if a tank contains any product it is considered "in use" and must be maintained by the property owner. Fuel tanks that contain product and are neglected or considered out of service can cause problems for owners and operators many years later. They will continue to corrode and will likely contaminate groundwater and surrounding soil. State law requires that tanks that are not "in use" must be properly "closed." Closure of tanks is defined by state law to mean either removal of thte tank or the filling of the empty tank with soil, sampling the surrounding soil for contamination, and re-filling the soil cavity with native soil.

State law requires that only certified individuals may legally remove a personal use tank with capacity over 1,100 gallons, and for this, a permit is required from the State Fire Marshal — FLST division. On your own property you are allowed to remove an underground tank less than 1,100 gallons without a permit and without being certified, but before you do, always notify the State Fire Marshal — FLST Division a month ahead of time, to ensure that precautions are made to prevent an explosion or other problem. Deaths have occurred due to improper removal procedures. If your tank is smaller than 1,100 gallons, document the steps you take to legally close your tank, including notifying the State Fire Marshal — FLST Division that the tank has been closed.

If you are aware of f uel tanks that have been abandoned on your property, try to deterine their location. Also, try to find out whether the thanks still hold product or have holes. Closure of these tanks must be carried out. If a tank is removed, it should be thoroughly cleaned before disposal in a landfill or at a scrap metal dealer.

If you are concerned that you have an abandoned tank that has been leaking, consult an environmental engineer, NDEQ, or Natural Resource District (NRD) investigator to determine if further investigation is warranted. A groundwater pollution problem caused by leakage usually becomes more difficult to manage and more costly the longer it is left unattended. The NDEQ and NRD have regulatory authority to investigate potential pollution situations and recover costs from resopnsible parties.

5. Storing lubricants

Many Nebraska rural residents maintain a large inventory of lubricants on hand for vehicle and equipment maintenance. According to one survey, a typical Nebraska farm may have 48 gallons of engine oil and 28 gallons of hydraulic / transmission oil as well as greases, antifreeze, fuel / oil filters, and other maintenance items. Improper handling, storage, and disposal of lubricants can contribute to contamination of groundwater and soil.

Sealed metal or plastic containers from the supplier are best for storage of lubricants. If you transfer the lubricant to another container, be sure to collect any spills that occur to avoid contaminating the soil. A special room for lubricant storage is ideal so that animals and children can be kept away from the products, and spills can be contained. Containment of spills can be as simple as having a plastic container under the storage container. For oil drum storage, the floor should have an embankment so that it can hold 50 to 75 gallons of liquid. Always dispose of used maintenance products and oils properly. Refer to *Fact Sheet 7, Improving Hazardous Materials and Waste Management,* for information on dealing with oil, antifreeze, and lubricant waste.

CONTACTS AND REFERENCES

Who to call about...

Tank registration, reporting closure and changes in tank ownership:

Nebraska State Fire Marshal — Flammable Liquid Storage Tank Division, 246 South 14th St., Lincoln, NE 68508, (402) 471-9465.

EPA regulations:

U.S. Environmental Protection Agency, Region VII, 726 Minnesota Avenue, Kansas City, KS 66101, (800) 223-0425 or (913) 551-7000.

U.S. Environmental Protection Agency, 401 M Street S.W., Washington, DC 20460.

Petroleum product storage, tank testing methods, and equipment suppliers:

Nebraska State Fire Marshal — Flammable Liquid Storage Tank Division, 246 South 14th St., Lincoln, NE 68508, (402) 471-9465.

Petroleum product spills:

Your Local Emergency Response People — 911

Nebraska State Fire Marshal — Flammable Liquid Storage Tank Division, 246 South 14th St., Lincoln, NE 68508, (402) 471-9465.

Nebraska Department of Environmental Quality, P.O. Box 48922, Lincoln, NE 68509-8922, (402) 471-2186.

Financial assistance for product spill cleanup:

Nebraska Department of Environmental Quality, Cleanup fund, P.O. Box 48922, Lincoln, NE 68509-8922, (402) 471-2186.

Health effects of gasoline-contaminated groundwater:

Nebraska Health and Human Services System, P.O. 95007, Lincoln, NE 68509-5007, (402) 471-2122.

Tank testing:

Nebraska State Fire Marshal — Flammable Liquid Storage Tank Division, 246 South 14th St. Lincoln, NE 68508, (402) 471-9465 (list of testing equipment manufacturers available)

What to read about..

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Tank design, installation, and site selection:

The Interim Prohibition: Guidance for Design and Installation of Underground Storage Tanks. U. S. Environmental Protection Agency. EPA / 530-SW-85-023. Longer document, contains technical information. (2)

Nebraska Administrative Code Title 159—Rules and Regulations for Underground Storage Tanks. Nebraska State Fire Marshal. (4)

Petroleum product storage and handling:

Fuel Storage. Farm Energy Tips CC270. Gives recommendations for fuel storage on the farm. (1)

Code of Federal Regulations. 40 Parts 87 to 135. U.S. Government Printing Office. (3)

National Fire Protection Association Code 395 (tanks less than 1,100 gallons) and *National Fire Protection Association Code 30 and 30A* (tanks greater than 1,100 gallons). National Fire Protection Association.

Fuel Storage. NebGuide G81-560. Gives recommendations for fuel storage on the farm. (1)

Tank regulations, financial responsibilities:

Musts for USTs: A Summary of New Regulations for UST Systems. U.S. Environmental Protection Agency. EPA / 530 / UST-88 / 009. September, 1985. (2)

Dollars and Sense: A Summary of Financial Responsibility for UST Systems. U.S. Environmental Protection Agency. (2)

Publications available from...

1. Your local extension office or directly from IANR Communications and Information Technology, University of Nebraska-Lincoln, 105 Ag Communications Building, P.O. Box 830918, Lincoln, NE 68583-0918, (402) 472-9712.

2. U.S. Environmental Protection Agency, 401 M Street S.W., Washington, DC 20460.

3. U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, D.C. 20402-9328.

4. Nebraska State Fire Marshall, Flammable Liquid Storage Tank Division, 246 South 14th Street, Lincoln, NE 68508, (402) 471-9465.

5. National Fire Protection Association, 1 Batterymarch Park, Box 9109, Quincy, MA 02269-9101, (617) 770-3000.

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