

Why Not Recover The Loss?

By Ken Steward

Basin Engineering Corp., Midland, Texas

More and more attention has been focused on the recognized fact that millions of dollars a year are lost in the weathering of crude oil in lease storage tanks. This loss, in the form of a reduction in net oil volume, is a result of vented tank vapors during the weathering process in most oil storage installations.

Vapor Losses

Factors affecting this loss in volume range from changes in ambient temperatures to pressure change from production to storage prior to sale. The greatest losses generally occur at the higher treater or separator pressures emptying into oil storage tanks. This reduction in pressure allows an expansion which releases the light gases which were being held in solution. The higher or more volatile API gravity crudes and higher solution gas-oil ratios also contribute proportionally to the higher vapor losses.

The best possible production techniques can be employed in an attempt to reduce vapor losses, but at best it would mean only a partial reduction.

Since the goal of every producer is to recover at the highest efficiency and the goal of every oil regulatory body being to conserve natural resources, the industry has banded to develop an economical and efficient means of recovering vapors now being vented and wasted to the atmosphere.

Vapor Recovery

Of the many recovery systems tried, the so called "Vapor Recovery System" seems to hold the most promise.

A vapor recovery system draws

vapors from the top of vapor-tight oil storage tanks as the vapors collect and build up pressure. To facilitate installation and operation, these systems are skid mounted, packaged units requiring a minimum of piping and wiring. A typical unit consists of a motor-driven compressor with an inlet scrubber, a liquid accumulation trap or blowcase, a control panel and associated control valves completely piped and inter-wired. Some Units are equipped with gas measurement devices. All are designed to operate unattended with a minimum of maintenance.

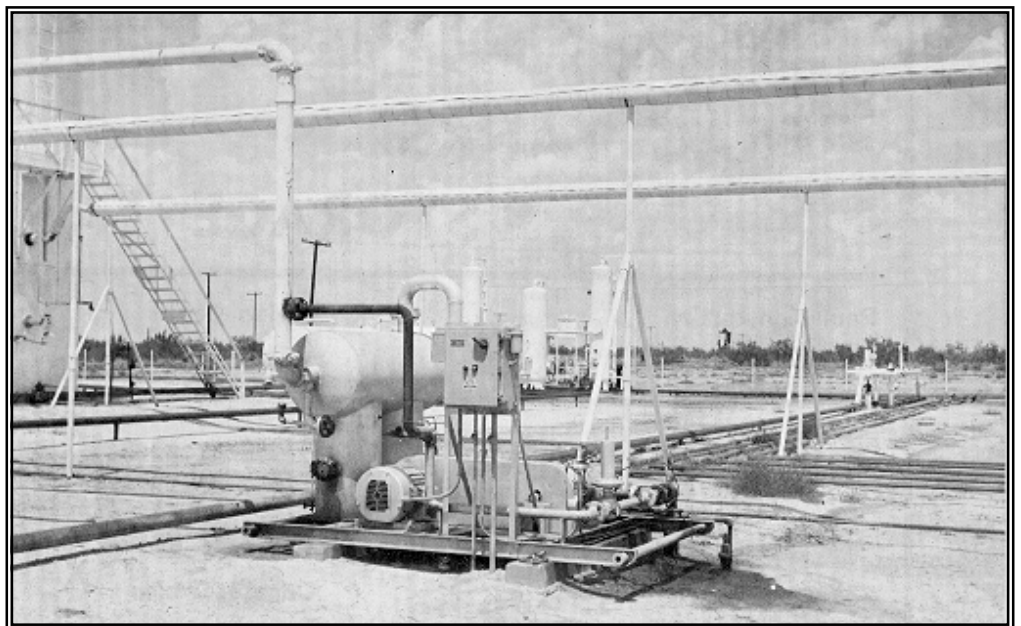
One of the basic requirements for a successful recovery system is to insure that the oil storage tanks are vapor-tight and relief hatches are in perfect working condition. The "brain" of a good system is in the pressure switches used to sense the vapor pressure build up. These switches must be accurate to a fraction of an inch of water pressure in order to control accurately the vapor withdrawal by the compressor. Most units employ a by-pass around the compressor in order to maintain a positive gas blanket. To further insure a positive pressure and prevent any air

inhalation during a cooling process, an external gas-blanket should be provided. Eliminating air from the storage tanks prevents the possible sale of air but more important reduces tank corrosion and possible fire and explosion hazards particularly in sour crude applications. This feature alone promises an economical contribution.

Economic Feasibility

The economic feasibility of a vapor recovery system is derived from the sale of the vapors collected where the market is generally a gasoline plant. Most leases sell separator or treater gas to plants under a casing-head gas contract, thus, eliminating the need for additional flow lines when installing a vapor recovery system.

The value of the vapors collected is dependent on the GPM content (gallons of liquid per thousand cubic feet of gas) as covered in the lease casinghead gas contract. This GPM value is derived by a representative gas sample analysis. One method is to compress the sample to a prescribed pressure, induce sub-cooling and



Here is a typical vapor recovery unit, designed to combat annual loss in net oil volume through weathering of crude oil in storage tanks. Some installations earn back the cost of the unit in just a few months.

LACT Generally Enhances Profitable Vapor Recovery

measure the liquid produced. The liquid portion is generally made up of the richer or lighter hydrocarbons such as methane, ethane, propane and natural gasolines sometimes referred to as "drip".

The GPM of stock - tank vapors normally run several times higher than the casinghead gas by being richer which means it will bring a higher price. This may warrant an independent volume measurement in the form of an orifice meter, particularly if large volumes of vapor are recovered.

Profitable Potentials

The current trend toward tank battery consolidation, unitization, and automation in the form of LACT (Lease Automatic Custody Transfer) installations has brought large volumes of oil together at central locations. The storage of these large volumes generally means it would be profitable to recover the vapors. Profitable vapor recovery, however, is not limited to the larger tank batteries. Careful analysis will determine the recovery potential on a tank battery which should include an

Accurate measurement of the vapors being vented, the market demand and value of the vapors through a GPM test and the installation cost of a recovery system.

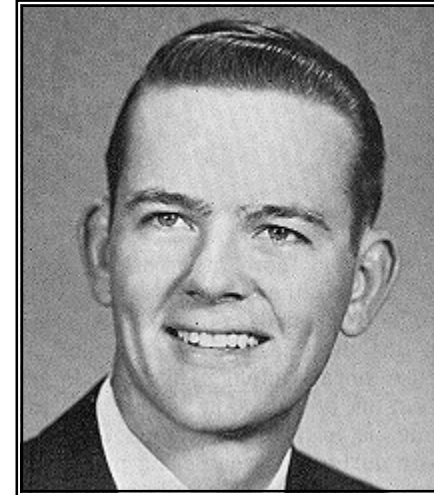
There are instances when vapor recovery systems installed in the Permian Basin have returned the actual cost of installation within a few months.

An estimate as to the cost of a skid mounted vapor recovery unit can usually be obtained from one of the manufacturers of this type equipment

Factors that generally establish the cost of a vapor recovery system include the volume of vapor to be recovered, sales line pressure, the type of compressor and driver, the safety devices and the degree of automation required.

With services available today it is an easy matter for the production to determine if it is profitable to recover his tank vapors.

Ken Steward, on the staff of Basin



**Ken
Steward**

Engineering Corp. in Midland, Texas, has prepared this Vapor Recovery paper for DRILL BIT. Steward has a B.S. degree in Petroleum Engineering from Texas Tech and has been on the Basin Engineering staff for the past five years, primarily concerned with process instrumentation and automation. He is past secretary of the Instrument Society of America, Permian Basin section.