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PENETRANT PROFESSOR APPROVED

## Penetrant Inspection Waste Water Treatment

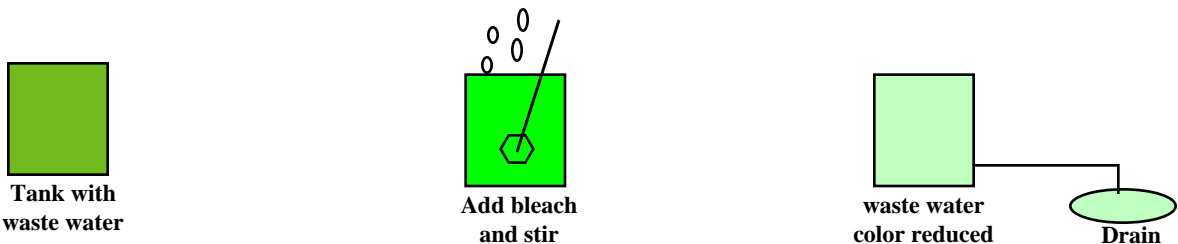
During the penetrant inspection process water is employed to remove the surface penetrant with methods A, B, and D. This results in a high volume of liquid with a small amount of penetrant in the case of method A, or penetrant/emulsifier in the case of methods B & D. Typical penetrant process waste water contains 2000-4000 ppm of penetrant inspection material as a contaminant. This is a small amount of material but since the materials are intensely colored, (yellow green in the case of **Type I** fluorescent and reddish pink for **Type II** visible) attention is drawn to the effluent stream. The discharge limits in different areas vary widely depending upon the treatment capabilities of the local POTW (public owned treatment works) sewage plant. Sampling is usually at the property line which means the penetrant waste stream has been diluted by other facility waste streams and contaminated with their particular waste. Limits address such things as turbidity, total dissolved solids, BOD (biological oxygen demand), COD (chemical oxygen demand), FOG (fats, oils and greases), heavy metals and a growing list of specific chemicals. The required analysis to detect some materials is quite sophisticated and many municipalities are not adequately equipped to differentiate between some acceptable and unacceptable chemicals. **Met-L-Chek** has developed a line of penetrant materials which will accommodate the requirements of most discharge regulations. It should be noted that even the most environmentally friendly products can not be put down the drain as concentrates but only in the as used condition of high dilution ratio. There is no single national POTW standard so the user must check the local discharge regulations to make sure of compliance with the local facilities capabilities.

### WASTE WATER TREATMENT

In view of the fact that regulations are dynamic, and analysis interpretations are not foolproof, there are situations where even the use of environmentally friendlier products will not pass the local requirements and the penetrant process effluent must be treated. This is accomplished most easily at the source of waste generation rather than after several different waste streams have been combined. There are a number of methods available which can help in meeting the regulations.

### BLEACH

In many cases it is only the color of the discharge that is of concern to the POTW. Plain old bleach will quickly kill the color. This is usually done in batches where the waste water is collected and treated in a holding tank, then discharged. Check regulations for local acceptability.



Waste-1/6/04





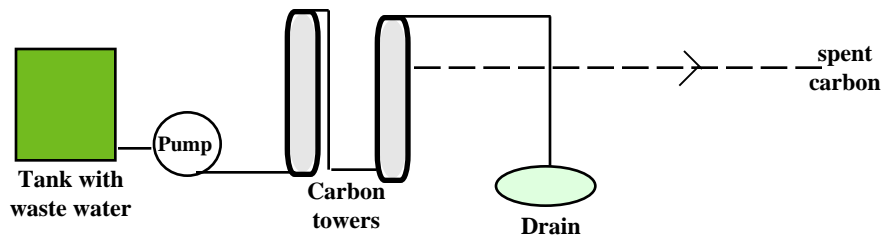
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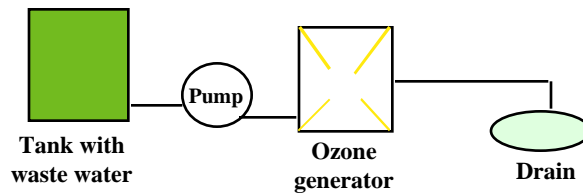
### CARBON FILTRATION

This is one of the oldest and most commonly used methods of reducing the content of penetrant materials in the effluent stream. It is effective in removing the color and hydrocarbon content in a continuous stream process. The emulsion associated with water washable penetrants often reduces the effective life of the carbon. Carbon filtration is very effective following other removal techniques. When the reuse of water in the process is desired carbon filtration following one of the other methods is recommended to ensure removal of trace amounts of surfactants.



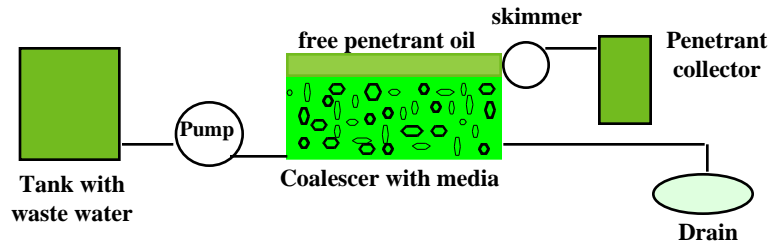
### OZONE TREATMENT

This method has been demonstrated to quickly remove color but may not be as rapid in a stream process at reducing the total organics as desired. Batch processing may be needed to reduce the BOD and COD levels to meet some regulations. This is an approach that is more effective on solvent based penetrants than the surfactant based biodegradable penetrants.



### COALESCERS

The use of this method relies heavily on the incompatibility of the penetrant and water. It is very effective with post emulsifiable penetrants especially in the pre rinse water. It becomes less effective with emulsions associated with water washable penetrants. Newer types of coalescer media and processing techniques have improved this methods effectiveness with some emulsions but it is still viewed as a PE penetrant process treatment method.



Waste-2/6/04





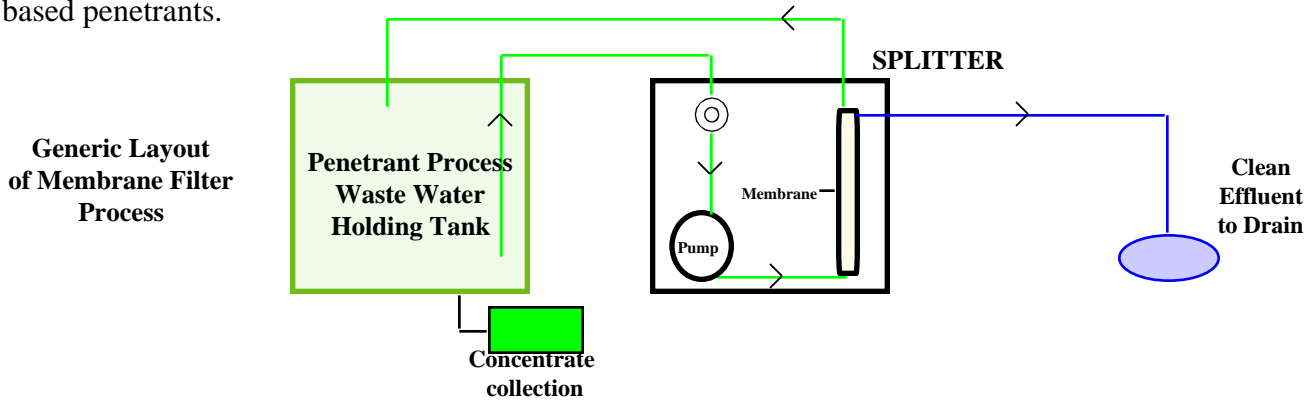
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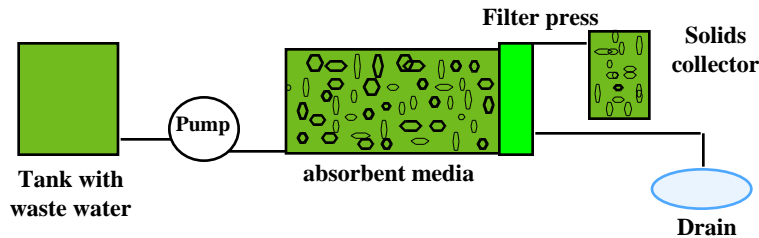
### MEMBRANE FILTRATION

There are several types of filtration covered by this general heading. In a nut shell it is a filter method that uses a media with molecule selectivity to allow water to pass through it but not larger hydrocarbon molecules. The membranes may be hollow tubes and fibers or spiral wound sheets. Ultra filtration and nano filtration have been used with varying success on penetrant effluents. The methods are expensive initially and require considerable membrane maintenance. The membranes must be protected from particulate matter in the waste stream so bag filters are often part of the system. The selection of the right molecular weight membrane and membrane material are keys to success. The method works by concentrating the penetrant waste by dewatering the waste stream during a series of passes through the membrane. The concentrated penetrant waste is then collected and disposed of as a liquid waste through a waste disposal handler. This method is often followed by carbon filtration to yield water that is quite clean. Nano filtration is more effective with surfactant based penetrants than ultra filtration. Both methods work well with oil based penetrants.



### ABSORBENT MEDIA

Penetrant waste water has been treated with electrolytes and then mixed with absorbent clays. The mix is filtered and the solids disposed of as solid waste. This proved to be a bit cumbersome. Newer absorbent media have been developed that are more selective and will take hydrocarbons from water more readily in stream processing. There are specialized systems available that automate much of this process.



Waste-3/6/04



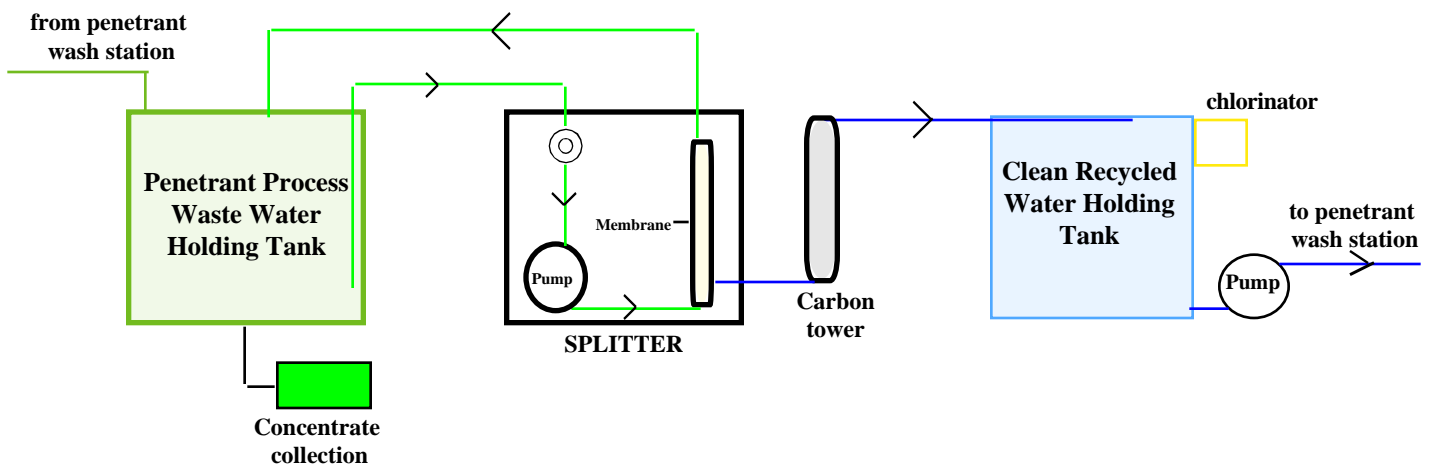


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## Penetrant Inspection Waste Water Treatment & Recycling

Generic layout for utilizing different treatment methods to facilitate the recycling of water for the penetrant process. This approach uses nanomembrane filtration followed by carbon filtration, and water storage sanitation with a pool type chlorinator.



Waste-8/6/04

