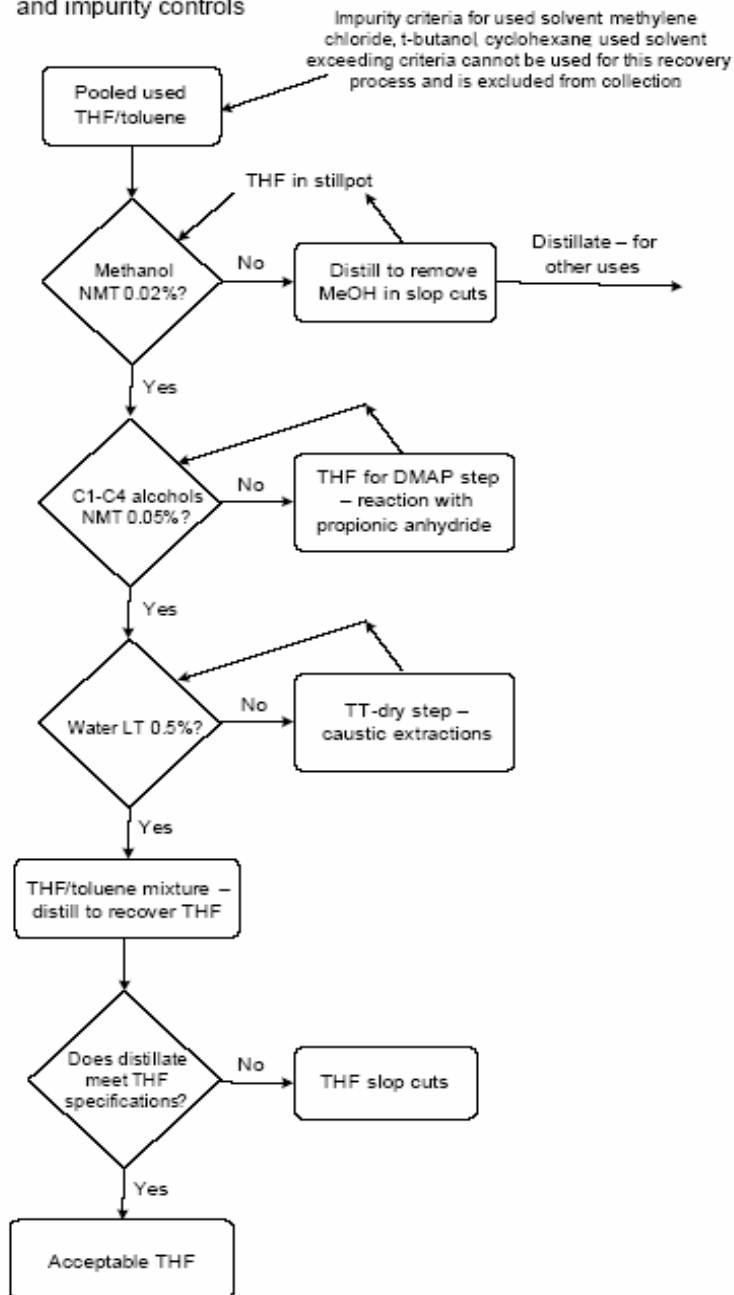


Guidance Number: 045

Appendix I. THF recovery process

**Simplified Process Flow
and impurity controls**



Appendix II. Volatile impurity specifications for Used THF to be Recovered

Component	Specification	Comment
Methylene chloride	NMT 1.0 vol-%	With higher amounts of methylene chloride, recovered THF may not meet its methylene chloride specification of NMT 0.2 %.
t-Butanol	NMT 0.1 vol-%	Separation of t-butanol from THF is poor in this process.
Cyclohexane + 2,3-dimethylpentane	NMT 0.75 vol-%	Separation of these components from THF is poor in this process.
Methanol	NMT 0.02 vol-%	Methanol is separated from THF with a preliminary distillation. A series of total refluxes and slop cuts are performed until the methanol content meets the NMT 0.02% limit. This is necessary to prevent formation of methyl propionate in the THF for DMAP processing step (used to diminish amounts of other alcohols). Methyl propionate cannot be distinguished from THF by the GC assay method used, which could result in a false GC assay result for THF.
C1-C4 alcohols	NMT 0.05 %	This includes methanol, ethanol, isopropanol, and butanols. If the THF feed is higher in alcohols before beginning the product cut, the THF product may not meet the total alcohols specification. Ethanol and isopropanol are controlled using the THF for DMAP processing step, by DMAP-catalyzed reaction with propionic anhydride to form higher-boiling propionate esters.
Water	NMT 0.5 vol-%	Water is not easily removed from THF in this process. Quality of the THF product is not diminished if the THF feed contains 0.2 to 0.5% water, but yields are reduced. THF feed higher in water is sent through a caustic drying step prior to being acceptable for distillation.