

OSCG



Buffalo - 2024

Replacing Discontinued Solvents for Oxygen Components Cleaning



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The Times They Are A-Changin'

Bob Dylan

Change is inevitable. This is especially true in today's solvent cleaning world.

Government bans and discontinued products create challenges!

Accept there are situations you cannot do anything about!

But that doesn't mean you're powerless to move forward. Take action!

Replacement technology exists now!

Presentation Outline

Focus on new replacement solvents – validation methods – and discuss alternative cleaning technology on the market today.

- I. The “WHAT”
- II. The “WHY”
- III. The “HOW”
- IV. VALIDATION



THE WHAT!

Recent upheaval for available approved solvents used to clean oxygen components/devices

Traditional vapor degreasing and flush solvents are facing environmental concerns!

Some solvent manufacturers are exiting the market

Some solvent materials are being banned or severely restricted by the US Government.



What solvents are affected now or will face future regulatory issues?

3M publicly announced to exit per- and polyfluoroalkyl substance (PFAS) manufacturing and **discontinue use** by the end of **2025 or before?** Trade name for this product family is **NOVEC**.

HFC solvents will no longer be acceptable for use per DoD, GSA, and NASA guidelines. The *American Innovation & Manufacturing (AIM) Act* mandates **40% of HFC's** will be removed from the market in **2024**.

EPA Toxic Substances Control Act (TSCA): "**CHEMICAL RISK EVALUATIONS**" contain direct statements from EPA: "***use of these substances presents unreasonable risk to human health!***"

- Trichloroethylene (TCE)
- Perchloroethylene (PERC)
- 1 Bromopropane (nPB)
- Methylene Chloride (MC)
- n-Methylpyrrolidone (NMP)

THE WHY!

With today's supply chain challenges and meeting Federal, State, or local regulatory compliance, timelines for replacing specific solvents are more important than ever!



If using any of these solvents for vapor degreasing or final flush cleaning operations, time may be running out.



Check any solvents currently being used for cleaning by product name, SDS, or CAS # and verify that they will be affected.

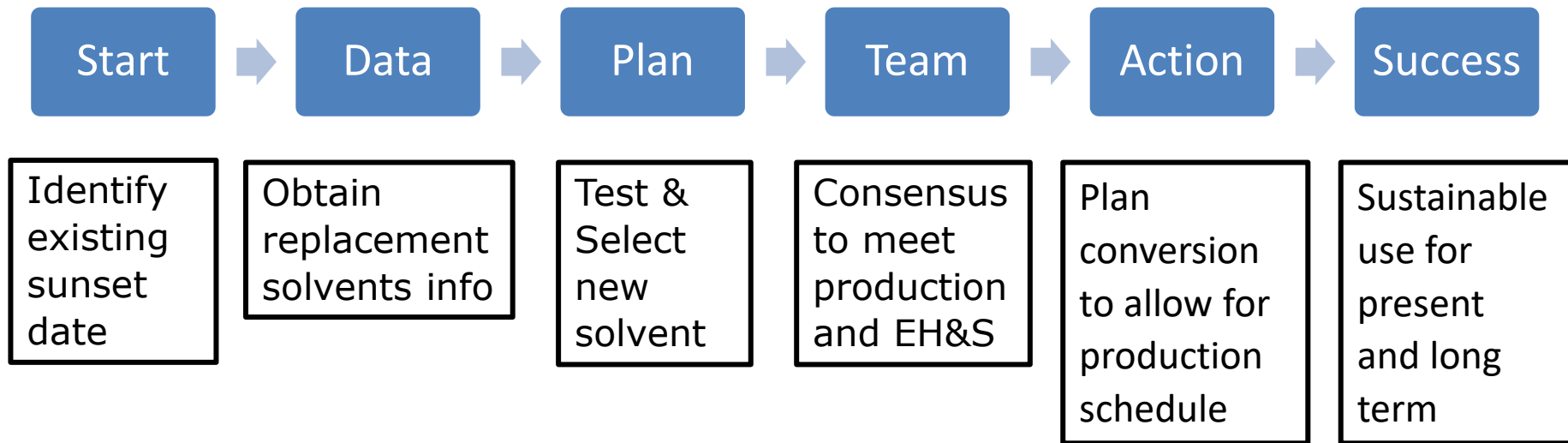
Thoroughly review any replacement solvent being considered

THE HOW!

Help is available for solvent users that are seeking replacements for specific solvents that are being discontinued or ban!

Now is the time to act to ensure environmental compliance, performance validation, and approvals to meet your production needs.

Progressive Steps to Deliver Success



CRITICAL COMPONENTS RELIABILITY....MANDATES CRITICAL CLEANING PROCESSES!

**Removal of
all surface
contaminants
is mandatory!**



Move to Environmentally Green Cleaning Process

Cleaning Validation Background!

If using **LOX or GOX** , operational hazards can be dangerous!

Materials of component fabrication often include:
hydrocarbon-based oils, metal particulates, and other debris.

Contaminant residue (fuel) + oxygen
under certain conditions, + ignition = fire
and possible explosion

This possible condition is why component
cleanliness and verification is *critical!*

Validation and sustainability = crucial



Validation!

Establish safety standards that your replacement solvent must meet.

Develop test methods to be conducted under specific environmental and performance conditions required to ensure cleanliness levels are achieved.

Consider all facets of cleaning process implementation into your facility or work area:

- ✓ Personnel Health and Safety
- ✓ Environmental Compliance
- ✓ End results



Reference Cleaning Specifications!

**NASA MSFC –Specification for Solvent Cleaning
Doc# MSFC SPEC-3709**

**NASA Glenn Research Center – OXYGEN Safety Manual
Doc# GLP-QS-8715.1.5 – Revision C**

**NASA SSC - Surface Cleanliness Standard of Fluid Systems
Doc# RPTSTD-8070-0001 – Rev 3**

**DoD - Precision Cleaning and Testing of Shipboard Oxygen,
Helium, Helium-Oxygen, Nitrogen, and Hydrogen Systems.
Doc# MIL-STD-1330E(SH)**

Environmentally preferred new generation solvents are designed to replace solvents containing HFEs / HFCs / PFAS and other regulated ingredients.

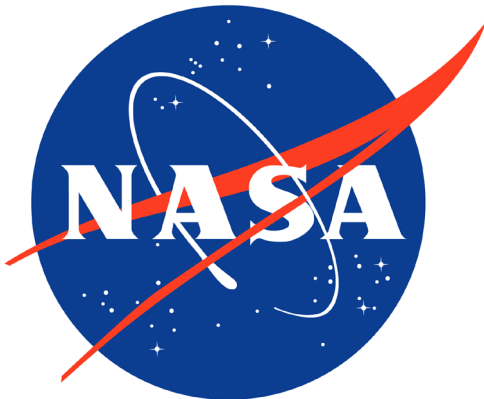


HIGH PERFORMANCE / CRITICAL CLEANING:
It is critical that oxygen lines and other components used in military and aerospace applications are completely clean and free of any debris that could create an operational failure.

NASA has stated that solvent “stabilizer additives, although <1% of the solvent, can affect NVR residues and must be considered and controlled for oxygen cleaning applications”.

NASA Study for 3M Novec Replacement

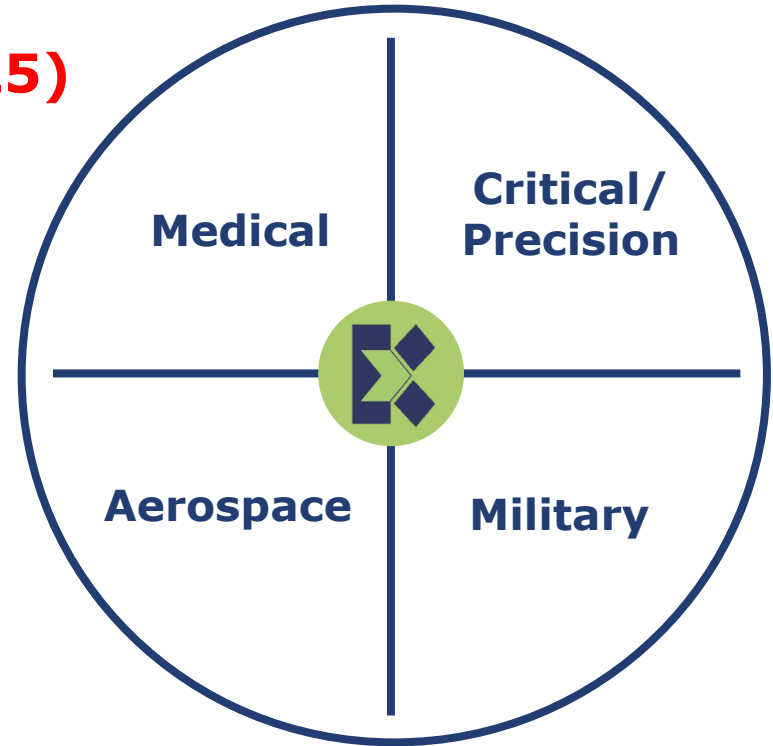
- NASA MSFC is currently conducting a study authorized by the Defense Logistics Agency (DLA) for new solvents to replace 3M products.
- There are multiple solvent candidates being tested. Final report will be issued soon due to 3M expiration time frame.
- **3M Novec solvents will expire in 2025 or before with no new orders accepted after March 2025!**



HFES and HFCs Replacement

Why Change?

- 3M Novec discontinuation (2025)
- HFES – PFAS classification by EPA and some states
- HFCs – AIM Act phase out (40% by end of 2024)
- Environmental issues
 1. regulatory
 2. compliance
 3. validation
- Supply availability



Why Act Now?

Time is required to investigate available options, ensure validation of process, and evaluate long-term sustainability. Things to consider include:

- Compatibility with substrates and soils
- Compatibility with existing equipment
- Approvals (internal / external)
- EH&S concerns
- Production transition
- Calculate true operational cost for solvent considered
- If new equipment is required –capital investment – lead time?

Non-Compliance is not an option!

Get Informed!

- **There is an abundance of information available in today's world to consider the best cleaning method to suit your needs.**
- **From government resources, environmental organizations, equipment suppliers, chemical suppliers, to technical papers and consultants.**
- **There are companies that will perform cleaning analysis of your parts using a specific process to verify the results before you make a commitment. Most are free!**
- **Use these resources to supplement your decision.**

Summary

While any future forecast is uncertain – the move to phase out several solvents is certain and underway now.



Don't be caught waiting!

Questions and Contact Information

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