

The Application of the Centers for Disease Control and Prevention (CDC) Recommended Airborne Exposure Limits (AELs) by the U.S. Army Chemical Materials Agency (CMA)

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Background: CDC-Recommended AELs

■ Nerve Agents

- GA (tabun), GB, (sarin) and VX
- Inhibit cholinesterase
- AELs Published in U.S. Federal Register October 2003
- Recommended Implementation by January 2005

■ Blister Agents

- H, HD, and HT (monitored as HD)
- Irritant, Vesicant, Alkylating agent
- AELs Published in U.S. Federal Register May 2004
- Recommended Implementation by July 2005



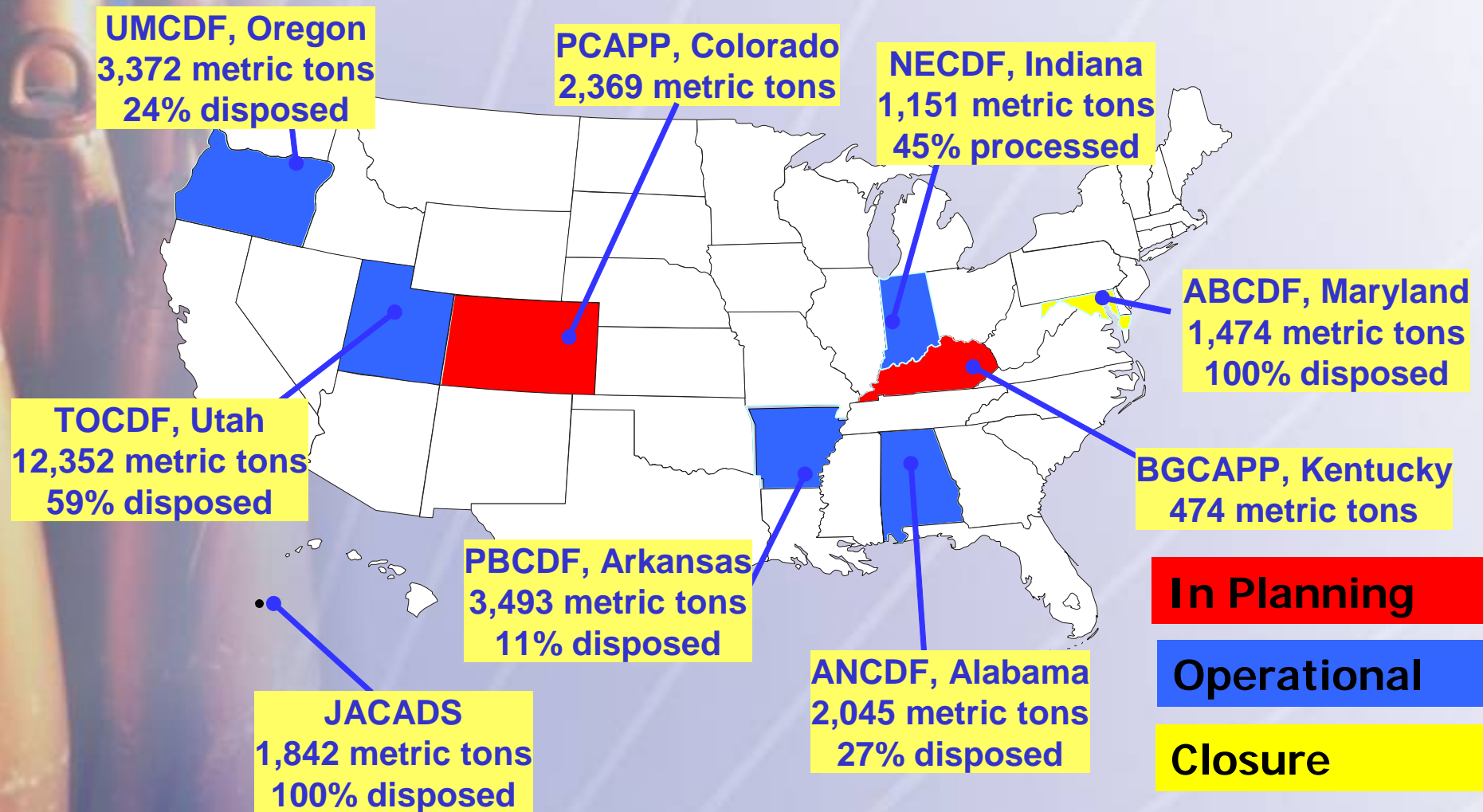
CDC-Recommended Airborne Exposure Limits (AELs)

Agent		General Population Limit (GPL)	Worker Population Limit (WPL)	Short-Term Exposure Limit (STEL)	Immediately Dangerous to Life or Health (IDLH)
GA, GB (mg/m ³)	2005	0.000001	0.00003	0.0001	0.1
	1998	0.000003	0.0001	none	0.2 - Army [†]
VX (mg/m ³)	2005	0.0000006	0.000001	0.00001	0.003
	1998	0.000003	0.00001	none	0.02 - Army [†]
H, HD (mg/m ³)	2005	0.00002	0.0004	0.003	0.7
	1998	0.0001	0.003	none	none
Averaging Time	2005	24-hours	8-hours	15-minutes	≤ 30-min.
	1998	72-hours	8-hours	none	≤ 30-min.

[†]Value established by U.S. Army



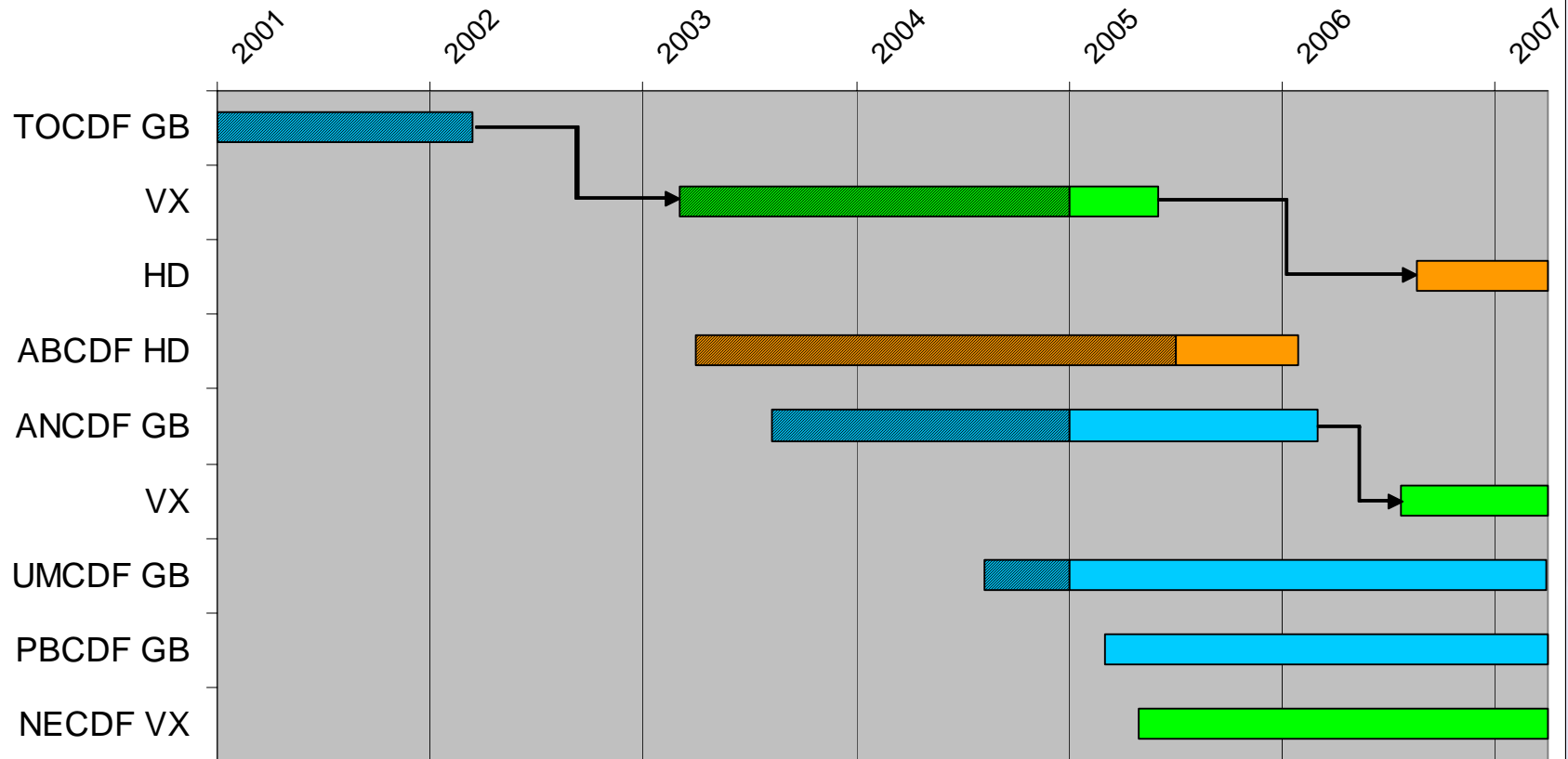
U.S. Chemical Stockpile



As of 11 March 2007 - Source: <http://www.cma.army.mil>



Chemical Warfare Agent Campaigns and AEL Implementation



Note: Hatched areas represent 1988 AELs
Clear areas represent 2005 AELs



Background: Monitoring Technology

WPL typically monitored using historical sampling and analysis

- Air samples collected on sorbent tubes in field and analyzed in facility laboratory.
- Results not known until laboratory analysis is complete.



Sample collection station



Sorbent tube



Gas chromatograph

Background: Monitoring Technology

STEL typically monitored using near-real time instruments – can sample, analyze, and report in 15-minutes or less.



- **Automatic Continuous Air Monitoring System (ACAMS)**



- **MINICAMS®**



Purpose

Compare performance of monitors for chemical warfare agent in air with quality control criteria recommended by CDC

- **Are sampling and analytical methods measuring within +/- 25% of the true concentration 95% of the time?**
 - Instrument-test data does not account for sampling
- **Alarm set point/reportable limit can be adjusted to account for variance. Alarm set point is generally 70% to 50% of AEL target value.**



Scope of Review

- **Scope**

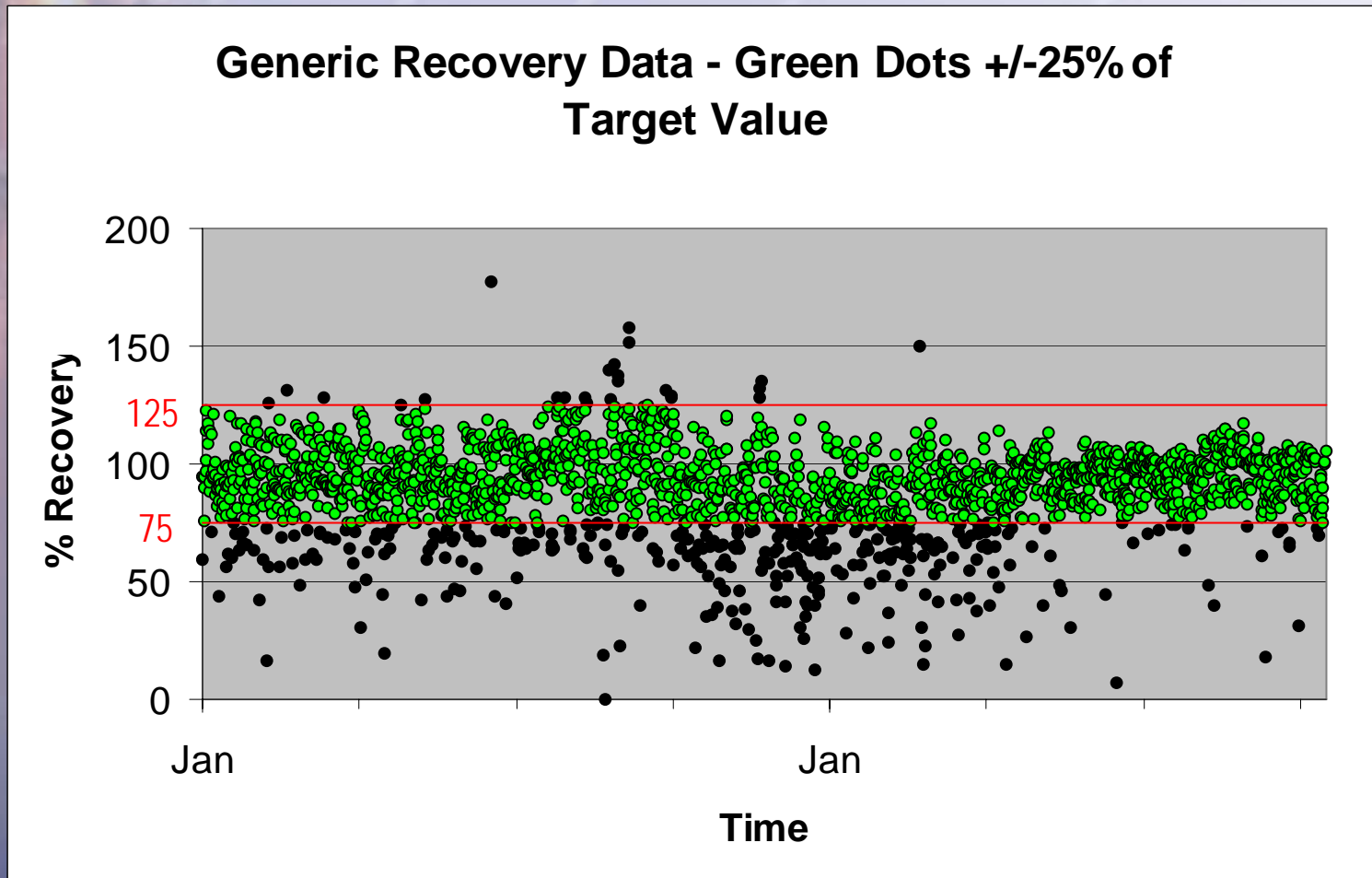
- WPL and STEL methods
- Locations where unmasked workers are present

- **Time Frame for each site**

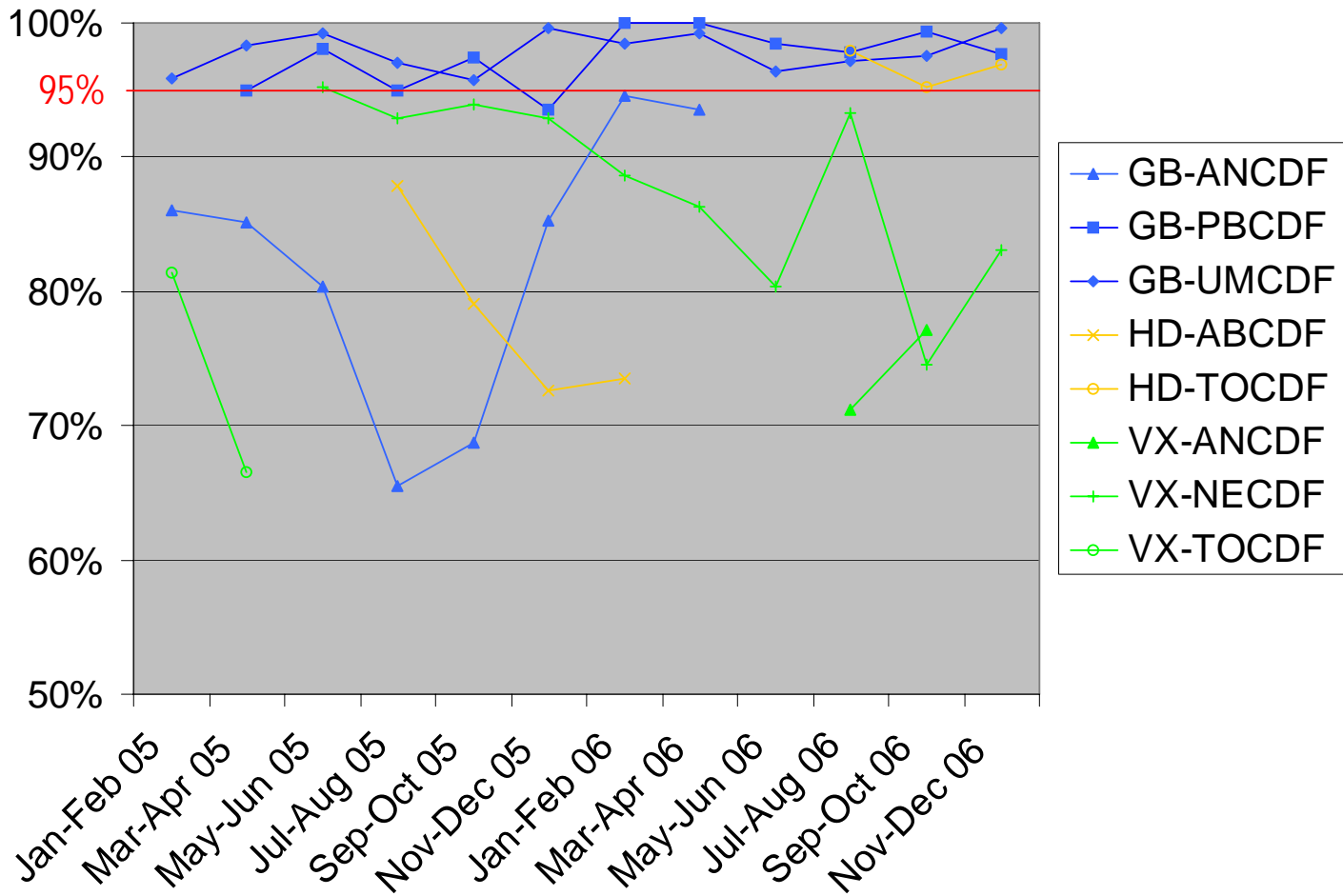
- Begins after implementation of AELs
- Continues during disposal campaigns
- Ends at campaign completion or closure



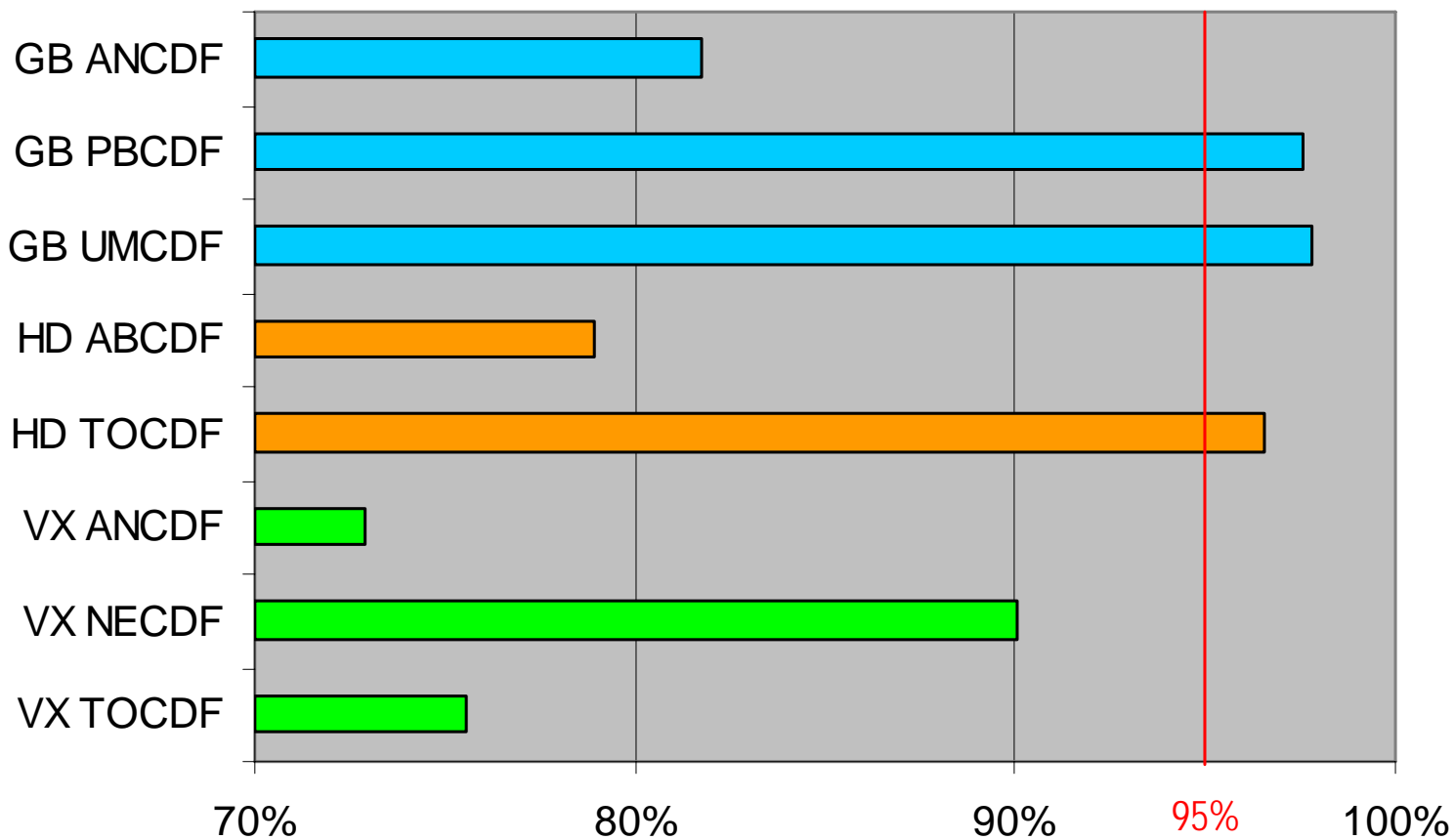
Generic Example: AEL Recovery Data



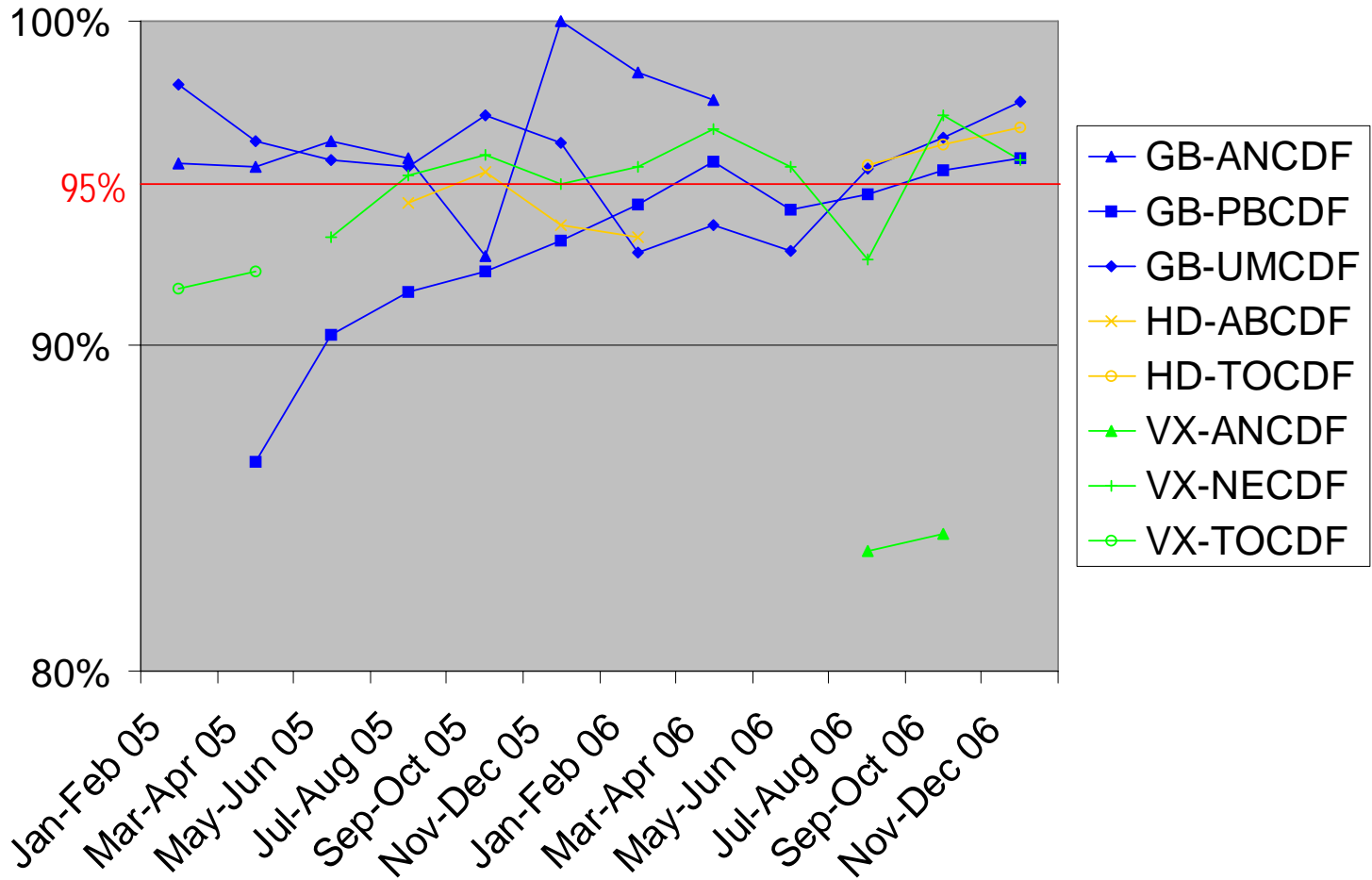
QC Recoveries Within +/-25% of WPL Target Value



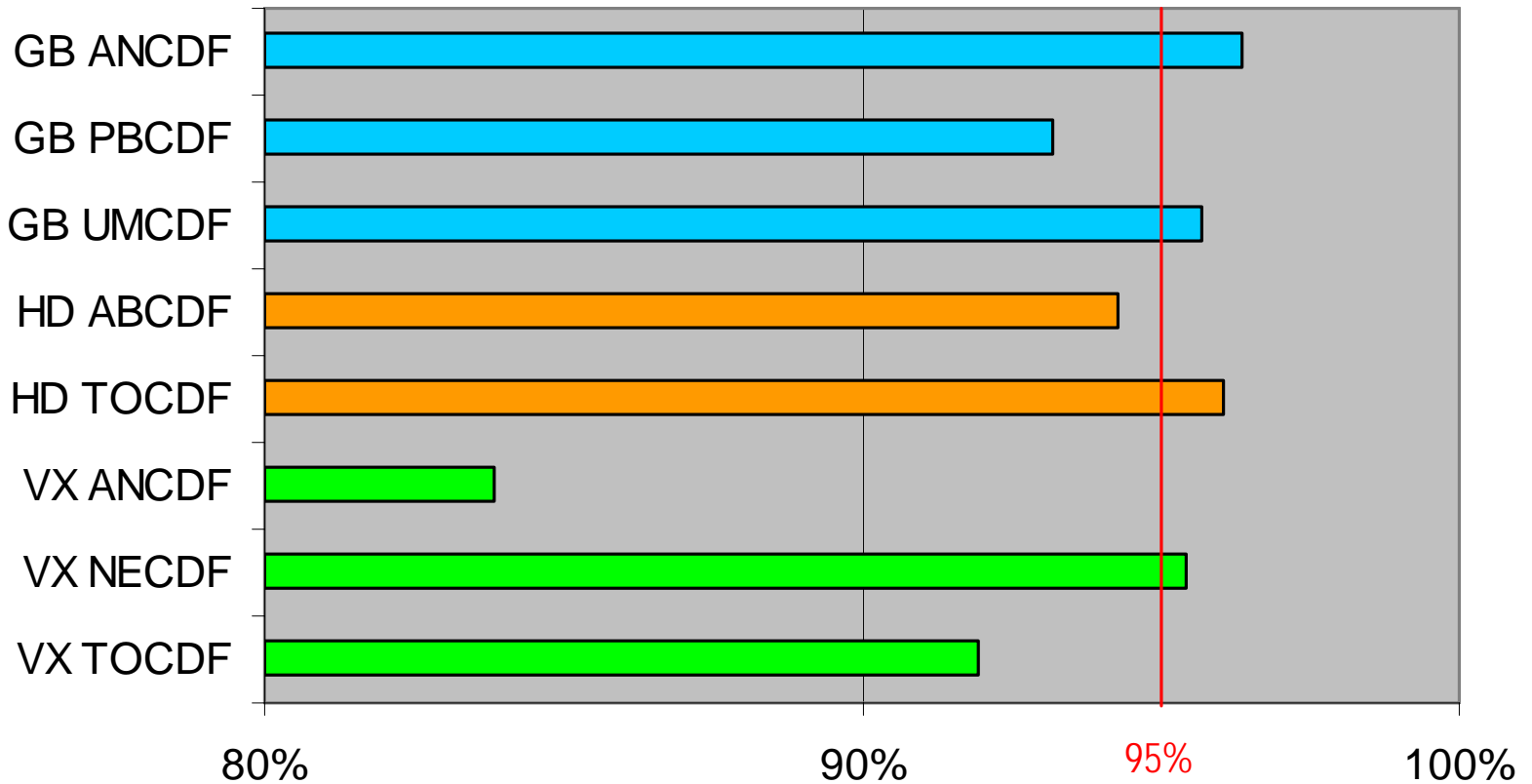
QC Recoveries Within +/-25% of WPL Target Value



QC Recoveries Within +/-25% of STEL Target Value



QC Recoveries within +/-25% of STEL Target Value



Conclusions

■ Study Suggests:

- CDC recommended performance can be attained for GB/HD-WPL and GB/VX/HD-STEL methods.
- Methods not meeting performance criteria will require reduction in set point/action level.
- Continuous improvement can be tracked and compared with quality goals.

■ Future Research:

- Account for transmission efficiency through heat-traced sample lines along with instrument performance.



References

- ***Final Recommendations for Protecting Human Health From Potential Adverse Effects of Exposure to Agents GA (Tabun), GB (Sarin), and VX, U.S. Federal Register. 2003;68(196):58348 .***
- ***Interim Recommendations for Airborne Exposure Limits for Chemical Warfare Agents H and HD (Sulfur Mustard), U.S. Federal Register. 2004;69(85):24164.***
- ***Chemical Materials Agency Programmatic Laboratory and Monitoring Quality Assurance Plan, U.S. Army, June 2004.***
- ***Chemical Materials Agency Programmatic Monitoring Concept Plan, U.S. Army, June 2004.***
- **All data provided by U.S. Army Chemical Materials Agency.**

