

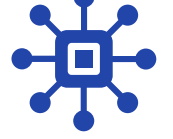
STUDY OVERVIEW & LEARNING OBJECTIVES



BACKGROUND
Modern healthcare and military operations continue to rely on disposable respiratory protection, creating recurring challenges in manufacturing, stockpiling, logistics, and medical waste. This project evaluates a sustainable, biomanufactured antimicrobial respirator platform designed to reduce lifecycle demand while strengthening domestic manufacturing and supply chain resilience.



RESEARCH OBJECTIVE
Evaluate how a reusable antimicrobial respirator platform enhances force health protection while reducing supply chain burden and improving operational readiness.



ADVANCED BIOMANUFACTURING

- Embedded antimicrobial technology
- Multi-layer filtration
- Extended reuse



SUPPLY CHAIN RESILIENCE

- Lower raw material demand
- Reduced warehousing
- Fewer transportation requirements



OPERATIONAL PROTECTION

- N95/N99-equivalent filtration
- Roles of Care 1-4
- Expeditionary and fixed facilities



DOMESTIC MANUFACTURING

- U.S. production
- Distributed manufacturing
- Pandemic preparedness

1) Analyze vulnerabilities affecting PPE manufacturing and supply chains in contested and CBRN environments.



2) Evaluate reusable antimicrobial respiratory protection as a strategy to reduce logistics demand and lifecycle costs.



3) Assess how distributed domestic manufacturing improves medical readiness, operational resilience, and strategic preparedness.





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JOINT FORCE READINESS • FORCE HEALTH PROTECTION
UNPREDICTABLE ENVIRONMENTS
Operational medicine solutions that support survivability and readiness across every environment.



Reduces the Logistical Load in Austere and Contested Environments

TRADITIONAL DISPOSABLE – HIGH LOGISTICAL BURDEN



- High inventory requirements
- Frequent resupply
- More required transportation
- Increased storage needs
- Higher costs
- More waste



REDUCED BURDEN – INCREASED READINESS

- Extended Use – Proven Antimicrobial Defense
- Reduces Waste – Supports Sustainability
- Designed for Performance in Harsh Conditions
- Lower inventory requirements
- Less frequent resupply
- Reduced transportation
- Minimal storage needs
- Lower total costs

BIOMANUFACTURING FOR SUPPLY CHAIN RESILIENCE
Federal agencies are prioritizing resilient, domestic, and sustainable PPE supply chains to protect the nation and its people.



★ THE CASE FOR TRANSFORMATION ★



REDUCE DEPENDENCE ON FOREIGN SOURCES



EXPAND DOMESTIC MANUFACTURING CAPACITY



INCREASE RESILIENCE FOR FUTURE THREATS



LOWER TOTAL COST OF OWNERSHIP



ADVANCE SUSTAINABILITY AND ENVIRONMENTAL STEWARDSHIP



PROTECT PEOPLE. STRENGTHEN READINESS. SECURE THE FUTURE.

TRANSFORMING THE MEDICAL SUPPLY CHAIN THROUGH REUSABLE ANTIMICROBIAL RESPIRATORY PROTECTION

Reducing demand across the entire PPE lifecycle—not simply extending mask life.

Current PPE Supply Chain Model
Linear • Fragmented • High Demand



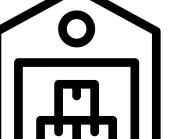
RAW MATERIALS
Global sourcing of petroleum-based polymers & chemicals



MANUFACTURING
Complex, energy-intensive production at scale



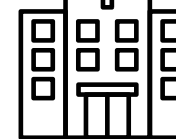
TRANSPORTATION
Long-distance shipping vulnerable to disruption



WAREHOUSING
Large inventory requirements and ongoing storage costs



DISTRIBUTION
Multi-tier distribution with limited agility



CLINICAL USE
Single-use disposal after hours of wear



MEDICAL WASTE
High volume of infectious waste sent to landfill or incineration

A Sustainable, Biomanufactured Platform that Moderates Health Risk, Waste, and Cost Across the Entire Lifecycle



BIOENGINEERED FIBER MATRIX

High-efficiency multi-layered filtration

EMBEDDED ANTIMICROBIAL TECHNOLOGY

Continuous protection against bacteria, viruses & fungi

REUSABLE • HIGH-PERFORMANCE

Maintains fit, filtration, and protection over multiple use cycles

Strategic Outcomes
System-Level Benefits. National Impact.



OPERATIONAL READINESS
Reliable action when and where it's needed.



DOMESTIC MANUFACTURING
U.S.-based biomanufacturing ensures supply security and job creation.



REDUCED LOGISTIC BURDEN
Fewer shipments, fewer touchpoints, lower risk of disruption.



LOWER INVENTORY REQUIREMENTS
Reusable platform reduces demand and stockpile volume.



REDUCES INFECTIOUS WASTE
Dramatically less single-use waste sent to landfill or incineration.



HEALTHCARE SUSTAINABILITY
Lower environmental impact and greener healthcare operations.



STRATEGIC STOCKPILE RESILIENCE
Longer shelf life, less turnover, stronger national preparedness.



PANDEMIC PREPAREDNESS
Scalable, reliable protection for future outbreaks and mass casualty events.



80–95% Reduction in PPE Use



70–90% Reduction in Waste



40–60% Reduction in Logistics



30–50% Lower Total Cost of Ownership