

CIMR® Natural Disaster Recovery System (CNDRS)

Remediation efficiency improvement with CIMR® Technology to eliminate toxic fumes, germs, virus, bacteria, mold, and fungi in all shared spaces.

Originally posted

The CIMR® Natural Disaster Recovery System (CNDRS) was designed to meet the needs of the State of Texas to respond to hurricanes and major flooding. The system can be adapted to other disasters. (tornadoes, earthquakes, power outages, and fires). CNDRS is a program designed to re-start local governments, businesses and allow for people to return to their residences in the shortest possible time. CNDRS provides a shorter time for recovery. In addition, CNDRS allows for cost containment for the recovery by the state by working with insurance companies and other state and federal agencies for natural disasters.

CNDRS Benefits

A CIMR® implementation provides significant advantages over traditional storm recovery methods:

- Reduce repair and restoration costs by 40-80%
- Allow more federal and state funds targeted toward disaster prevention and mitigation
- Reduce the time away from homes and businesses from 6-12 months to 1-3 weeks
- Reduce the time in temporary homes by 60 to 90 percent
- Reduction of toxic fumes, germs, virus, bacteria, mold, and fungi in homes allowing people to quickly enter their homes
- The systems can be used in both Human, animal and bird populations
- Ensure population remains in localities (reduce population scatter), which restores the communities faster and more efficiently
- Eliminate environmental waste of discarded building materials from storms
- When needed CNDRS can provide temporary housing or shelter locations with technology designed to prevent cross contamination

Remediation Technology

Mold is the Word: No matter which disaster happens mold is a word which represents peoples' fears about living or staying in a place that is contaminated with germs, virus, mold, and fungi. These containments are devastating to a building because it grows rapidly and causes toxins to be emitted. For example, during flooding because of rainfall, storm surge, or overflow, buildings become contaminated with water from all types of contamination, both chemical and biological. The CRNDS address both types of containments on surfaces and in the air.

No Tear Out

The traditional method of dealing with flooded structures ("Tear Out") is to tear out the sheetrock, insulation, flooring, and all household items and discard them. The result the owners must move out during the process of drying which includes fans, dehumidifiers etc. The process is expensive, keeps families out of their homes and businesses for weeks and months, and impacts the environment by congesting landfills with hazardous material. The result is months of waiting for a rebuild as construction services are at a premium and may be unavailable for long periods. On the other hand, CRNDS provides significant advantages over traditional storm recovery methods:

- Reduce repair and restoration costs by 40-80%
- Allow more federal and state funds targeted toward disaster prevention and mitigation
- Decrease time away from homes and businesses from 6-12 months to 2-3 weeks
- Ensure population remains in localities near on in their homes (reduce population scatter)
- Eliminate or significantly deduce the environmental waste of discarded building materials damaged because of flooding.
- Maintains Law and order and maintains property values.

CIMR® Tech

At the core of CRNDS is CIMR®, a technology that kills viruses and bacteria, mold and germs in homes and buildings. The core patented CIMR® technology of CIMR® is patent pending and is commercially available along with inexpensive to operate and install. CIMR® works by creating 0.02 parts per million (ppm) of non-aqueous hydrogen peroxide (H₂O₂) from the oxygen and humidity that already exists in the air; therefore, requiring no consumable supplies. The CIMR®

then diffuses everywhere air travels, continuously disinfecting microbes in places that other technologies cannot reach. The CIMR® molecules have both localized positive and negative charges; they are literally drawn to viruses, bacteria and mold by electromagnetic attraction and are destroyed. CIMR does not create ozone or harmful side effects and is safe for humans, animals, and other life forms.

Kansas State University ATCC Test

CIMR, which is University and field tested extensively proved that it was a world class technology. Kansas State University (conducted by ATCC - <https://www.atcc.org/>) observed that CIMR® technology demonstrated the ability to disinfect 96.4% to 99.93% of viruses, bacteria, and mold spores on surfaces within two hours.

200 Plus Remediation Field Tests

We have had 200 plus field test in real life situations to prove our technology works every time. In the field our processes continue to prove that we can stabilize, sanitize, and move people back into the homes, business, and work placing within a few days after major natural disaster.

40-89 Percent Remediation Savings

Individual and businesses that have use CIMR technology have realized saving between 40 – 80 percent depending on the severity of their issue. The worse the problem the more the savings and the quicker they are back up supporting the communities and generating profits. Listed below are a few locations where the CIMR family products have been and are being used to stabilize, sanitize, and prevent the reestablishment of germs and virus of all types and in various environments.

- Corpus Christi Naval Air Station:
- Fort Hood Army Base
- Bolling Airforce Base
- Lamar University
- Spindletop Museum
- MHMR (Texas Based Institution)
- Pine Forest Baptist Church (60,000 sq. ft facility which was under 18 inches of water)
- Homeland Security (multiple Locations)
- Port Arthur Armory
- FEMA, National Historical Society, and others

Working Remediation Systems

Working prototypes and operational units have been deployed to ensure the systems work. To increase the scale of recovery, mobile units on trailers (CIMR® Systems) can be designed allowing more workforce to deploy across a greater range of dwellings. There are two different types of mobile units. The first mobile unit consist of a generator, 6-8 mobile sanitization units, filtration system, HVAC systems, with extra heat strips for rapid drying. Each trailer can accommodate the needs of 6-8 homes at a time or work with alongside the other type of system on a large single or multi-story building. The second mobile unit consist of a generator, filtration system, (1) 20 to 30-ton HVAC System, with extra heat strips, 10 permanently mounted purifications for rapid drying, purification, and stabilization of a building.

Traditional Recovery Scenario (Best Case Scenario)

- Day 1 Water recedes
- Day 2-5 Dry-out
- Day 6-8 Sheetrock tear-out, cabinet, and flooring removal, loss of furniture etc.
- Day 9-20 Wait for supply delivery
- Day 21-60 Basic repair and stabilization
- Day 61-90 Install flooring, cabinets, and related repairs
- Day 90-120+ Family or Business Moves into Dwelling

Results: \$15-75,000 of repairs and furnishings (median home), 90-120 days of temporary living = approximately \$15,000 additional cost. Total cost to federal government \$30,000 to \$90,000 plus. Larger homes and businesses and office building the savings are much more significant.

Environmental: Tradition methods allows mold to remain suspended in air and above and behind the sheetrock cut line.

CIMR® Recovery Scenario (Average Scenario)

- Day 1 Water recedes
- Day 1 Dwelling Business Evaluation, Stabilization (Crew Move-in, Setup)
 - Remove excess water, prep walls, begin de-humidification and
- Day 2-3 De-humidify, bacteria and sanitization
- Day 4-5 Ready for habitation (potentially no cabinets, flooring, or sheetrock removal required)

Results: 1/6 to 1/8 the cost of conventional treatment, 5-7 days out-placement, mold is below non-flood standard and continues to remain below normal house standards (installation of permanent CIMR® units) People are back in their homes and business accelerating the return to normalcy.

Implementation

Timing and an organized deployment plan are critical for successful stabilization, and restoration of damaged buildings. Early preparation now can be the difference between a protracted, drawn-out recovery and the ability to reduce costs by 40-80% and to move a population back into their homes and businesses in weeks versus months or years. The (CNDRS) is driven using these strategies:

Buildings will be evaluated and processed according to this procedure

1. Assessment phase:

- Level 1- Minor wind, water (one to 4 inches of water) and structural damage. (Saving between 70-90 percent)
- Level 2 – Major wind, water (4 to 24 inches of water) and structural damage. (Saving between 40 – 80 percent depending on the spend of setup and stabilization)
- Level 3 – Severe: Severe wind, water (24 inches and up) and severe structural damage. (Saving between 20 to 50 percent depending on the spread of setup and stabilization)

2. Priority of Critical Infrastructure:

Buildings and dwellings will be evaluated and stabilized according to the following priority in collaboration with state and federal DR procedures and personnel.

- First responder stations, Storm HQ, water systems, and critical government facilities.
- Hospitals, emergency care, and elderly care
- Supply Sources: groceries, gas stations, repair supplies
- Wastewater, disposal, and cleanup operational units
- Hotels and Temporary living facilities
- Schools
- Businesses, homes, apartments, etc.

3. Treatment Phase:

- Stabilization: dwelling damage will be minimized and living conditions will be restored by temporary sealing the breaches in the building or home, providing electrical power, removing excess water, and leaving units in place until electricity is restored and breathing levels sustainable
- Sanitization: structure will be cleaned for habitation (people can return to homes or businesses) and structure is ready for cosmetic repairs
- Prevention: CIMR® is installed to prevent outside mold from infecting dwelling while repairs are being made; also reduces viruses and bacteria to reduce disease from spreading.

Teams (Workforce)

A trained workforce can be created to address large-scale recovery efforts. The teams consist of evaluators, leaders, and workforce operations. Advanced or highly specialized skills are not required for these positions and the workforce can be developed out of the local populations.

Deliverables of Plan

The system proposed in this document combines new technology and new approaches to a costly and time-consuming process. The proposal provides an outline to an attainable process that will be successful with planning with state agencies. The outline suggests a more in-depth study to follow using resources from Hi-TECH Air & Water Purification and relevant agencies to define goals, objectives, and actions, following a disaster. Planning in both contexts is strategic, operational, and tactical. This post-disaster planning process strives to actively engage stakeholders at every level within the State and local communities. Basis for Disaster Recovery Plan based on CRNDS using CIMR Rapid Recovery Systems (CRRS). Benefits of using our CRRS

systems. A CRRS "KIT" system approach to shorten the time between Hurricane disaster and return to normalcy for the affected area.

1. Saving of FEMA rebuild insurance costs, 60-80 percent depending on rapid response time.
2. Accelerate the return of people to their homes and jobs
3. Acceleration of re-establishing Infrastructure and business.
4. People have the ability in most cases return and live in their homes.
5. While in their home or business have an environmentally safe area to work and live in.

Typical Hurricane Event Activity/Timeline:

- Event time (Away from property) 3-7 days
- Disorganized effort to preserve property
- Overload of area temporary living facilities
- Higher Prices, people expect the Government to reimburse
- Loss of Home usage (furnishing, possessions, and sheetrock)
- Rip out of home materials and destruction of furniture. Bare studs at best living area.
- Mold has not been eliminated or controlled for several weeks. Dependent on access to capital
- Live in unfinished house or subsidized living
- Restoration of Home (6 months to a 1 year) providing the family has access to capital.

Responses to an event:

Type I Infrastructure

Return Governmental and Health Facilities to functional operational status as quickly as possible.

Examples

- Electrical Infrastructure
- Water and Waste disposal
- Police, City government
- Hospitals and Health Facilities
- Water and Waste disposal

Pre-stabilization by Hi-Tech personnel: CRRS mobile units plus stabilization equipment,

- CRRS units Equipment Setup: (4hours)
- Placing CRRS into damaged building/facilities (1 Day)
 - Controls Fungi, bacteria, germs, and mold
 - Controls Hazardous Dust Environments
 - Controls Hazardous Water Effects
 - Stabilization and drying: (24-72 hours average)

Post Stabilization

- Continue clean-up and sanitization process
- Installation of into the CIMR purification system within the AC/Heating
- Rebuild as required (Minimal)
- Return building to fully functional status within 1-2 weeks.

Type II Stabilize homes/apartments/businesses

This will allow people to return as quickly as practical and begin restoration of their properties and return business to being purposeful and serve the local communities. Hi-Tech personnel to set-up equipment.

Specific instances:

- Homes
- Apartments
- Assisted living and Nursing Homes
- Hotels for temporary living facilities
- Businesses

Pre-stabilization: (CRRS Stabilization Kit),

Rapid Stabilization for Homes

- Placing CIMR 414 into damaged homes/business (4hrs)
 - Controls Hazardous Dust Environments
 - Controls Hazardous Water Averments
 - Controls Fungi, bacteria, germs, and mold
- Cleanup and drying: (24-72 hours average)

Post Stabilization

- Continue clean-up and sanitization process

- Installation of CIMR 4000 and or 8000 into the AC/Heating
- Rebuild as required (Minimal)
- Return home/business to fully functional status. 1-2 Weeks.
- Finish the rebuild
- Return to normalcy as rapidly as possible.

Implementation Examples:

Type I Infrastructure provide People and Equipment to run CRRS

1. Deployed to 2-3 locations along the Gulf Coast 500 units each location.
2. Number of people to be pre-trained in the set-up and operation of the equipment that can rapidly scale the use of CRRS in the affected areas. Use of Military a possibility.

Type I CRRS (Infrastructure Kit) Contains the following (Figure 1)

- Generator 240/ 100-amp services to run CRRS and power panels
- Portable electrical extension panel to provide additional outlets throughout building.
- Electrical extensions cords for use with electrical panels
- A/C Heating
- Air filtration HEPA
- 8-10 CIMR Units installed (Treat 100,000 of floor space)
- 500ft 12 plastic tubing for movement of air from CRRS unit to facilities and floors
- Pre-Built mounting(s) for door/entrance for flex tubing
- Mounted on a Mobile Platform for transport
- Four Cases (16 gallons) ready to use Rx-15, four sprayers with instructions
- Installer to use laptop with video for training,
- maintaining of equipment.
- Four circulation fans for movement of air with CIMR inside of building

Type II Home Business Stabilization Kit contains the following

- Set-up of CRRS Self Contained unit with a HEPA air filtration unit. 110 volts
- Two circulation fans for movement of air with CIMR inside of home/business
- A CIMR 2000 for use by the homeowner to use in their temporary living facilities.
- Electrical extensions cords
- Rubber Gloves and masks
- One case (4 Gallons) of ready to use Rx-15, two sprayers with instructions
- Setup/Installer to use laptop with video for training to include maintaining of equipment.

Emotional Distress Alleviation:

- Saving of home/business and personnel belongings. (Basic Self Identity)
- Preservation of the community environment
- Reduces displacement of people and the workforce

Government Cost Savings:

- Insurance claims e.g., FEMA, State and or Insurance Companies
- Temporary living/housing
- Shelters
- Medical for related flood exposure e.g., Medicaid
- Long term building and infrastructure repair support

Overall Costs:

- Based on 25,000 homes and associated businesses the cost for preparedness and staging of CRNDS equipment can range from \$200MM to \$350MM.
- The cost savings to State and Federal Government for a single event can be in the range of \$500MM to \$1B.

Cost of Previous Hurricanes or Flooding:

\$1B expense; reduce 50-80% equals \$500-\$800M savings to State and Federal Agencies. Does not included cost mitigation to the insurance industry for participation and sharing of CIMR capital equipment expense.

Hi-Tech (CIMR Parent Company) Work Force Organization for the State:

1. Manager I, II, Sr. (Responsible for up to 25 teams)
2. Superintendent I, II, (Responsible for up to 5-10 teams)
3. Foreman Level I, II, III (Responsible for 1-5 teams)
4. Roustabout I, II, III 4 per team.

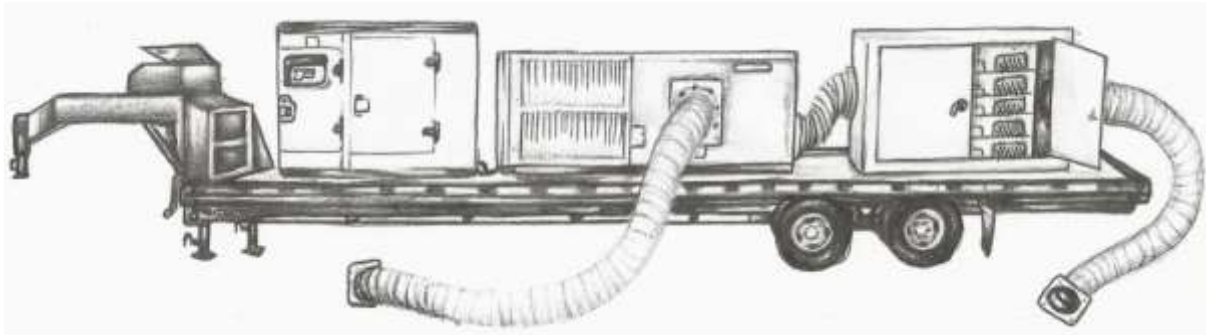
Training

Some basic thoughts for discussion on training based on the use of CRRS used in Type I, II Kits. There will be a small cadre of permanent people trained in the use of the equipment, processes and have primary responsibility maintenance and logistical deployment of the Type I and II Kits from various locations. Will have a responsibility to train additional personnel in the use of the equipment in the field once the equipment has been deployed to the affected areas. There will be next set of State (or other agency such as the National Guard) people that have a secondary responsibility for deployment and use of the Type I, II Kits. Additionally, they will have a responsibility to setup, install and train people in the use of Type I, II Kits when deployed to disaster areas. To rapid plus up personnel there will be a need for localized training centers (Permanent or Field Locations e.g., tents) for the basic instructions on deployment and use of Kit's I, II. Depending on qualification of personnel individual will be selected for various positions above. Most will fall into the Roughabout I, II, II category with a Few in the Foreman level. Initial Building of Equipment for mitigation and rapid recovery

Potential benefits for users of CIMR®

- Install of CIMR equipment for while the recovery system is moved on to a new location.
- Optional independent testers to verify homes and building are safe for occupancy
- Potential to provide mold warranty of the homes for homes and building. Renewable each year

Figure 1: CRRS (CIMR Rapid Recovery Systems) Kit



Next Steps

Developing and implementation a six-step plan:

- Define a single event to plan against e.g., flood and or hurricane.
- Plan for restoration using CIMR® technology.
- Integration with local command and control management to identify post event management for recovery based on CNDRS.
- Command and control requirements as a follow-on to the disaster relief command and control.
- Software to support recovery efforts.
- Communications equipment requirements.
- Support Personnel requirements
- Identify the number and types of CNDRS KITS and technologies to deploy to areas affected by a hurricane or flood e.g., sing defined event for planning purposes.
- Process and procedures for the deployment of the CNDRS Kits
- Training requirements to train the trainers of use of the CNDRS Kits
- Area identified for storage of CIMR Equipment and CNDRS Kits
- Amount of equipment and Rx-15 Product to be stored for initial deployment
- Additional resources to supplements the kit or alternatives.
- Potential Sharing or costs with other Federal Agencies, States and or insurance companies.
- Addition resources available and or required.
- Associated costs for recovery from a single event.

Attachment: Fort Hood Remediation Project

- ① Magazine Article
- ② PowerPoint Report



Advanced Mold Remediation

**Fort Hood Garrison Command
Directorate of Public Works**

New Photo-Catalytic Reactor



Fort Hood DPW: Test Site #2



- Recently the Fort Hood Directorate of Public Works has begun testing a new mold remediation technique to more efficiently and effectively clean mold situations.
- As seen in the example above, the process has had some staggering results.



Advanced Mold Remediation



- Benefits
 - Lower Cost
 - Non-Destructive
 - Faster Turn-Around
 - Much Lower Post-Remediation Spore Counts
 - Recovers Most Furnishings, Including Cloth Goods
 - Long-Term Mold-Prevention System Left in Place
 - Work Guaranteed



New Technology = New Capabilities



- Photo-Catalytic Reactor Based
 - Produces Hydrogen Peroxide Gas
 - A true gas – not an aqueous vapor
 - H₂O₂ produced from water vapor and oxygen already in the air
 - Continuous production of 0.02 ppm
 - Safe – 1/50th OSHA limit
 - Uses Ambient Temperature and Humidity



Fort Hood DPW: Test Site #1



- Building 39013, Room 312
 - Mold intrusion caused by minor flooding and HVAC condensate back up
 - Before and After pictures include upholstery that in other situations could not have been saved
 - Furniture savings per room range between \$1500 and \$6000 depending on the number of upholstered items, mattresses, and heavily mold stained wood

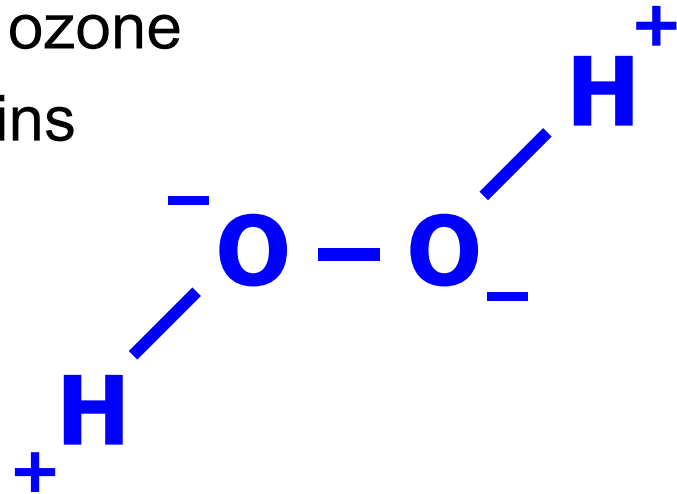




Hydrogen Peroxide Gas



- Similar to water in structure
- Has both + and – charges
- Drawn to mold by electrostatic attraction
- Kills mold 20 times faster than ozone
- Chemically degrades mold toxins
- Also kills viruses and bacteria

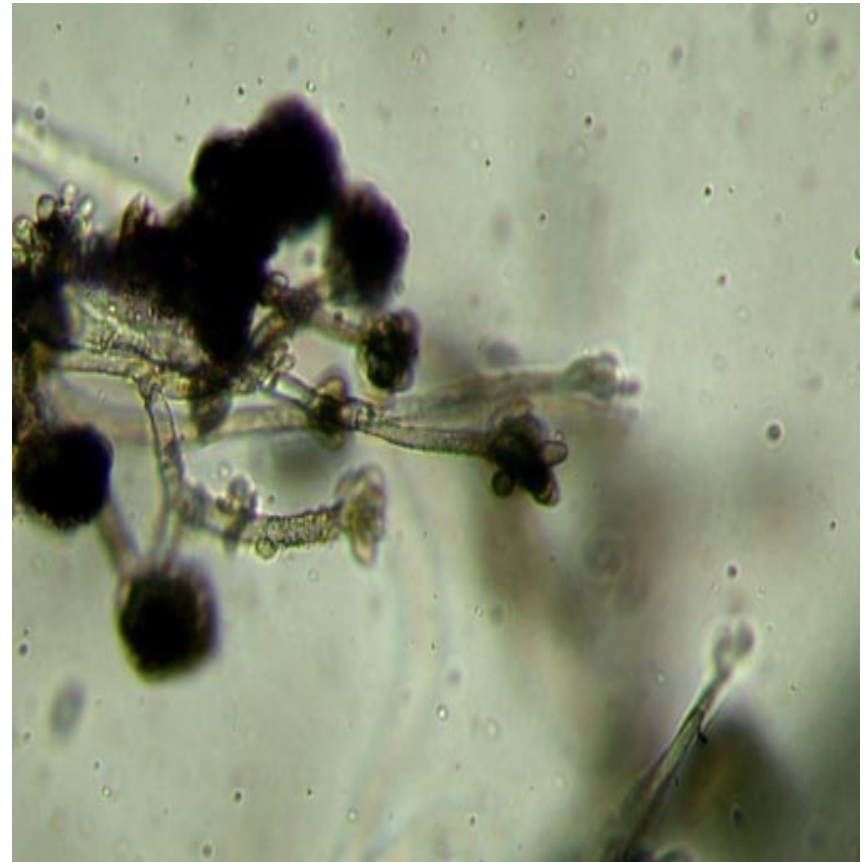




Mold and Other Fungi



- Fungi...
 - are designed to absorb water
 - attract water electrostatically
 - also attract hydrogen peroxide
 - are defenseless against hydrogen peroxide gas





Non-Destructive Remediation



- Process temperature and humidity process does not induce sporulation
- Mold is killed cell by cell down to point of attachment
 - Dead hyphae release from surfaces
 - Effective surface removal is then possible
 - Removal of structurally sound material is no longer necessary
- Hydrogen peroxide gas also diffuses into cloth and other porous material, killing mold
 - Cloth furniture, bedding, books, etc. can be saved
- Injection process kills mold behind walls
- Only limited surface refinishing is required after remediation to restore area to full use



University Testing



- Kansas State University
 - Dr. James Marsden, Regents Distinguished Professor, Department of Animal Sciences & Industry, K-State Food Science Institute
 - Microbial reduction on surfaces (Mold, Bacteria & Virus)
- University of Cincinnati
 - Dr. Sergey Grinshpun, Department Head, Center of Health Related Aerosol Studies, Department of Environmental Health
 - Reduction of the Aerosol Particle Concentration
 - Airborne Microbial reduction
- Sandia National Laboratories
 - Jill Bieker, Ph.D.
 - James L. Marsden, Ph.D.
 - Inactivation of Avian Influenza



The Bottom Line



- 33% to 66% savings on Total Dollars spent per job
- Faster turn around
 - Shorter execution time
 - No delay for reordering of furniture
- Less administrative cost
 - Fewer construction inspection hours
 - No furniture reordering administrative hours
- Fewer dollars paid out per project



Fort Hood sets new standard for mold remediation

by Brad Britain and Christine Luciano

Every Soldier deserves a clean, healthy work and home environment free from mold and mildew. The Fort Hood, Texas, Directorate of Public Works is actively addressing the problem of mold and mildew growth in barracks and other facilities. To bring this recurring and costly problem under control, DPW has used a new strategy for mold remediation and prevention for the past year and a half.

Contracting officers worked with the DPW facility management team to research, test and implement a strategy that uses hydrogen peroxide gas to treat mold and bacteria. DPW coordinated with an industrial hygienist in Preventive Medicine to test the hydrogen peroxide gas process.

The first and second test trials were successful in eliminating mold and mildew. The Texas State Board of Health was originally skeptical about the process. However, after seeing the rooms and reading the test results, the board chose to move forward on an experimental basis.

The high-tech air purification system is a combination of two technologies — ionization and commercial infection control technology. The system is a process that produces a very low concentration of hydrogen peroxide gas from oxygen and water vapor already in the air and then disseminates it into the facility. The hydrogen peroxide gas first sanitizes the air ducts, then sanitizes the air and exposed surfaces in the building reaching, over time, into every crack and crevice that air can penetrate, disinfecting microbes in places that other processes cannot reach.

The hydrogen peroxide gas is odorless and safe to use in occupied areas. According to the Occupational Safety and Health Administration, 1 part per million of hydrogen peroxide gas is safe throughout the work day. **Ozone-free CIMR infection control technology uses only one-fiftieth of that amount.**

Acronyms and Abbreviations

DPW	Directorate of Public Works
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“The problems with the barracks, mess halls, chapels and other facilities across the installation originated with heating, ventilation and cooling system malfunctions; leakage of water into the building from pipes and through walls and roofs; and old building designs,” said Jay Glazener, DPW facility manager.

Previously, Fort Hood’s approach to managing mold and mildew problems included two basic options. First, wipe down the walls, throw away bedding and upholstered materials, and paint the walls. Second, tear out the walls and discard all furniture and bedding, effectively gutting and renovating the entire area, along with all adjacent areas.

“The new process is an efficient, cost-effective solution to battling mold and mildew,” Glazener said.

George Henderson, a licensed mold inspector and tester for the state of Texas was asked whether leaks have to be fixed with this process.

“Yes, you have to fix the leak, but you do not have to tear everything out,” Henderson said. “I have witnessed some amazing things with this technology, from saving artifacts at Spindletop Museum in Beaumont, Texas, to eradicating mold and then keeping mold from growing back in a nine-story building that had no roof for months after Hurricane Rita.”

The hydrogen peroxide gas process has



Before treatment, this barracks room wall is covered with mold. Photos courtesy of Pat Fields



After the room was treated with the hydrogen peroxide gas process, the same wall shows the mold and mildew have been eliminated.

also been used by the Navy, the Federal Emergency Management Agency, the National Historical Society, Lamar University, the Texas Educational System and the Army Corps of Engineers.

At Fort Hood, more than 100 barracks rooms, a dining hall and a section of the Keith Ware Hall have been treated. The process effectively eliminated mold and mildew growth and has never failed. Rooms that were completely covered and looked black with mold are now pristine.

In addition to the clean up, an ultra-violet air purification system is placed ➤