# Case Study

## Commercial Final Clean for Air-Cooled CRAH Data Center

## North Texas

### Overview

DataBank (officially DataBank Holdings Ltd.) is a leading U.S.-based provider of Enterprise-Class Data Center, cloud, and interconnection services. Enterprise-class Data Centers aim for near-100% uptime, often targeting 99.999% (Tier III) or 99.995% (Tier IV) availability per the Uptime Institute's Tier Classification System. Additionally, Enterprise-class Data Centers serve as Interconnection Hubs with multiple network providers (AT&T, Verizon, etc.), enabling low-latency data exchange for cloud, SaaS (Software as a Service), or Edge Applications (low latency response down to the millisecond).

Headquartered in a historic former Federal Reserve Bank Building in downtown Dallas, Texas, the company focuses on delivering secure, scalable, and compliant infrastructure solutions for businesses undergoing digital transformation, particularly in the AI, edge computing, and cloud eras. With a motto of "Data Center Evolved™," DataBank emphasizes not just physical space and power but a holistic ecosystem that includes managed services, 100% uptime guarantees.

### Project: DFW9

DataBank DFW9 is a State-of-the-Art, under-construction Data Center facility located in Red Oak, Texas, serving as the Flagship Building in DataBank's expansive Red Oak Campus, a 292-acre site. As part of DataBank's broader expansion strategy to meet surging demand for AI, Hyperscale, and Enterprise workloads, DFW9 represents a significant investment in North Texas' digital infrastructure. Situated in the Dallas-Fort Worth metroplex, this facility underscores Red Oak's emergence as a key submarket for Data Centers, attracting major players like Google and Compass Datacenters. This development is fueled by a $725 million credit facility secured in April 2025 and a landmark $2 billion investment from global investors (including $1.5 billion from an Australian fund) announced in November 2024, enabling rapid scaling amid the AI boom.

Ted J. Pappas, Director of Operations

## Type

High-Density, AI-Ready Operations using DataBank's award-winning Universal Data Hall Design (UDHD), which supports flexible air and liquid cooling configurations. Awards include Data Center Solution of the Year, 2024 for their role in addressing high-density colocation demands driven by Generative AI and Golden Globee® Award, also in 2024 for UDHD's superior flexibility in scaling IT infrastructure, particularly for multi-tenant environments supporting hyperscale, traditional, and HPC (High Performance Cooling) needs such as HPC-ready with hybrid air/liquid systems; designed for energy efficiency (target PUE (Power Usage Effectiveness) <1.5) and sustainability, aligning with Texas' renewable energy resources.

## Checkmark's Initial Contract Value

$700,000 (for Commercial Cleaning Services)

## Duration

18 months (from superstructure erection to final commissioning)

## Scope

Checkmark was contracted early in the Project Lifecycle, providing manpower and ongoing cleaning support starting from the superstructure erection phase. This proactive involvement ensured contamination control throughout construction, which will culminate in a comprehensive Commercial Final Clean before equipment commissioning. The initial contract value of $700,000 covers labor, specialized equipment, and phased cleaning programs tailored to the Data Center's critical environment needs.

## Challenges

DFW9, particularly those with Hybrid Cooling Systems, which typically combine air-based cooling (e.g., fans, evaporative units, or chillers) with liquid-based methods (e.g., cold plates or immersion for high-heat components), through several mechanisms on both the air and liquid sides. These issues often stem from environmental factors like dust, gases, minerals, or microbes entering the system via intake air, water sources, or operational leaks.  During construction, activities such as welding, drywall installation, and HVAC system assembly generate dust, debris, and volatile organic compounds (VOCs) that can infiltrate raised floors, air handlers, and ductwork.

## Key Challenges

- ✓ High Contamination Risk: The fast-paced construction schedule (driven by market demands) increased the likelihood of embedded contaminants in CRAH coils, filters, and subfloor areas, potentially leading to equipment failures or reduced efficiency post-commissioning.
- ✓ Stringent Standards: The facility needed to meet ISO 14644 Class 8 cleanliness standards for operational readiness, ensuring minimal downtime and optimal performance of the Hybrid Colling Systems.

## Damage on the Air-Cooling Side

- Hybrid systems rely on air circulation for general temperature control, but contaminants like dust, particulates, and corrosive gases can disrupt this.
- Clogging and Insulation from Dust/Particulate. Dust accumulates on filters, coils, fans, and heat exchangers, acting as a thermal insulator that impedes airflow and reduces heat dissipation efficiency. This forces the system to work harder, leading to higher operating temperatures, increased energy consumption, and potential overheating of components.
- In summer or high-circulation periods, intensified cooling pulls in more airborne debris from underfloor areas or external sources, exacerbating buildup and causing uneven cooling or static discharge that degrades hardware over time.
- Corrosion from Gaseous Contaminants. Pollutants such as nitrogen oxides (NOx), sulfur oxides (SOx), or Volatile Organic Compounds (VOCs) from external air (e.g., urban pollution or industrial emissions) corrode metal surfaces in air handlers, contacts, and ducts. This is worsened by humidity, as moisture helps contaminants settle and react, leading to reduced system reliability, electrical failures, and shortened equipment lifespan.
- Free-air or evaporative hybrid setups are particularly vulnerable, as they introduce larger volumes of unfiltered outside air.

## Damage on the Liquid Cooling Side

- The liquid portion of hybrid systems (e.g., water or dielectric fluids circulating through pipes and cold plates) is prone to water-borne contaminants, especially in evaporative or closed-loop setups using reclaimed or untreated water:
- Scaling from Minerals - Dissolved solids like calcium or magnesium form crystalline deposits on heat exchangers and pipes when water evaporates or pH shifts occur. This insulates surfaces, narrowing flow paths, reducing heat transfer efficiency, and increasing pressure drops that strain pumps and lead to uneven cooling.
- Biofouling from Microbes - Bacteria, algae, or fungi thrive in nutrient-rich, warm water, forming biofilms that clog channels, impair thermal conductivity, and promote further corrosion. This is common in low-flow areas and can cause blockages, forcing system shutdowns for cleaning.
- Corrosion from Chemicals or Metals - Acidic or oxidative contaminants degrade pipes, valves, and exchangers, releasing rust or oxides that further restrict flow and contaminate the coolant. This accelerates wear, raises maintenance needs, and risks leaks that could short-circuit electronics.

Without proper mitigation, contaminants could compromise the Hybrid Cooling Components leading to higher energy costs and potential hardware damage, estimated to cost millions in repairs or lost productivity. Checkmark has implemented a phased approach, deploying a dedicated team of 15-30 technicians from the superstructure phase onward. This early manpower provision allowed for proactive contamination control, reducing the scope of the final clean and ensuring cost efficiencies within the budget.

The Checkmark Team, certified with OSHA 30 training, adhering to strict safety, LEED and ISO Protocols in conjunction with the General Contractor (GC), Rogers-O'Brien, directing activities to ensure a Post-Clean Particle Counts meets ISO 14644 Class 7 standards (exceeding the target).

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***Checkmark is ensuring North Texas Mission-Critical facility reliability, efficiency, and compliance. As Data Center demands continue to surge in North Texas, such integrated approaches will be essential for mitigating risks and maximizing ROI. This project serves as a benchmark for future hyperscale developments, underscoring that proactive contamination control is not just a cost but a strategic investment.***

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