OAK RIDGE NATIONAL LABORATORY MANAGEMENT & INTEGRATION PERSPECTIVE SUBCONTRACTORS AS PARTNERS IN SITE RESTORATION

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ABSTRACT

In 1997, the U. S. Department of Energy (DOE) Oak Ridge Operations (ORO) Office awarded the Management and Integration (M&I) contract for all five of their Oak Ridge Operations facilities to Bechtel Jacobs Company, LLC (BJC). This paper will focus on the success and challenges of several of the M&I projects at the Oak Ridge National Laboratory (ORNL). The initial goals for BJC were to transition up to 93% of their staff to the subcontract community as they moved away from operations to "integration." The perspectives of BJC and one of their Remedial Action/Decontamination & Decommissioning (RADD) subcontractors will be combined in this paper to share with others how "partnering" together was essential for success. Projects completed by Safety and Ecology Corporation (SEC) under their RADD subcontract will be used to illustrate the process and the challenges/successes to completion. These projects will include pond remediation, tank remediation, and building cleanup for reuse. All these projects were "fixed price" with defined milestones keyed into award fee for BJC and regulatory milestones for DOE. By working together to form integrated teams focused on site remediation without sacrificing safety, all milestones were met.

This paper will discuss the following items associated with the M&I environmental restoration projects at ORNL.

- Overview of the M&I Contract
- Challenges in transitioning from "operations" to "integration"
- Subcontracting strategies
- Subcontractor pre-qualification process
- Overview of ORNL Projects
- Integrated team effort required to achieve site restoration goals

INTRODUCTION

In 1996, as a part of contract reform, DOE ORO initiated an effort to restructure and rebid the Environmental Management (EM) Program work. At the time, work was being performed under a Management and Operations (M&O) contract. ORO's vision was to smoothly replace the M&O contract with an M&I in order to expedite cleanup, work safely, subcontract the work, transition the workforce to subcontractors, reduce cost, and perform needed integration work. Under the

M&O approach, work was baselined and executed using an operations-oriented organization. The M&I approach baselines and executes using a subproject-oriented, completion-driven and completion-rewarded organization. Subprojects have clear scope definitions, definitive durations and endpoints, and integrated estimates. The end point objectives established for work completion are clear and visible. The free-market based subcontracting approach replaces the in-house self-performance model with competitively bid commercial subcontracts.

ORO's vision was implemented in December 1997 with the award of a five-year, $2.5 billion M&I contract to BJC. Following a 3-month phase-in period, BJC assumed responsibility for the work on April 1, 1998. BJC is responsible for environmental cleanup, waste management and management of depleted uranium hexafluoride cylinders in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. BJC also supports DOE in a reindustrialization program to find commercial uses for many Oak Ridge facilities that no longer have a mission.

The integration component of the M&I approach is a significant challenge in itself. Successful integration requires carefully orchestrating EM Program work at five sites, (four of which are currently operating), in three states, with three separate state regulatory agencies under two different U.S. Environmental Protection Agency (EPA) regions. Further complicating this is the presence of a half-dozen other prime contractors working under multiple, discreet-funding controlled contracts.

TRANSITION FROM OPERATIONS TO CLOSURE

Since the M&I closure approach is to invest every available dollar into fieldwork and waste disposal, the overhead budgets quickly became primary targets for reduction. Business as usual became business unusual. All of the overhead work scope and associated budgets are now managed like a project with discrete scope statements, work breakdown structures, budgets, deliverables, etc. Funding for discretionary, non-value added "support" work is redistributed to fieldwork. This radical change from the past is representative of the M&I philosophy. This uncompromising commitment to simplify systems, processes, procedures, and policies is balanced against a sensitivity to avoid cutting needed core capabilities.

Consistent with the M&I philosophy, BJC focused early efforts on:

- Safety Performance
- Subcontract Procurement
- Workforce Transition
- Credible Life Cycle Baseline

SAFETY PERFORMANCE

The BJC approach to safety has four key elements:

- Continuing to instill a zero accident culture
- Pre-qualifying subcontractors based on their safety record
- Implementing Integrated Safety Management
- Holding individuals responsible for safety

Pre-qualifying subcontractors based on their safety record is a critical step to assuring good safety performance in a subcontracted environment. The process used during procurement is no different than any other pre-qualification criteria, and experience has been that companies that work safely also work efficiently. The only exception has been with drilling contractors, who, as an industry, have recordable injury rates that often do not meet the BJC pre-qualification standard.

The implementation of Integrated Safety Management System (ISMS) is also taken into account in the subcontracting strategy. For instance, BJC has elected not to require subcontractors to have their own ISMS program, but to work under the BJC ISMS Program. Another key factor in safety management is that the subcontract specifications flow down an appropriate level of rigor and safety policies and requirements.

The safety management system has been designed to accommodate the added complexities associated with the level of subcontracting built into the Oak Ridge M&I. Even with these added complexities, BJC has managed to improve safety performance. This is demonstrated by a reduction in the Office of Safety and Health Administration recordable injury/illness rate by 21% and the "lost workday away" case rate by 65% since BJC began the M&I contract.

WORKFORCE TRANSITION

As mentioned above, a key aspect of the M&I contract was to subcontract cleanup work to best-in-class subcontractors and transition the respective workers to the winning subcontractors. The contract specifies that, as work is subcontracted, the previous M&O contractor employees have right of first refusal for non-management jobs with subcontractors at substantially equivalent pay and benefits. To help set a perspective on the magnitude of the workforce transition efforts, as of December 2001, the following has occurred.

- Negotiated 5 labor agreements
- Awarded 32 subcontracts including workforce transition of a total of 870 employees
- Awarded 203 subcontracts and 107 of these have been completed

SUBCONTRACTING STRATEGY

To implement the contracting philosophy of DOE's vision, BJC competitively completed an aggressive effort to procure, on a competitive basis, 203 fixed-price or fixed-unit-price subcontracts with an estimated value of just over $1 billion.

To date, approximately 86% of the total EM Program funding has been subcontracted. This aggressive subcontracting effort has been accomplished under an added set of complexities associated with the Oak Ridge M&I contract that:

- Called for competitive procurement of subcontracts after award (no major pre-selected teaming partners)
- Required transition of the incumbent workforce to the successful subcontractors at substantially equivalent pay and benefits
- Required successful subcontractors to adopt employee benefit and pension plans, and in some cases, labor agreements
- Involves work at five distinct sites across three states

Finally, it is important to note that this shift from self-performance to competitively procured subcontracts has provided excellent value to the government. In fact, compared to the M&O baseline, a cost savings of over $450 million has been demonstrated. These savings can be attributed primarily to competition and innovation. Instead of specifying "how" a contractor is to perform a job, BJC has specified the desired outcome allowing the subcontractor to be innovative (and thus cost effective) in the method of accomplishment.

The following sections will give an overview of how the M&I contract is being implemented at ORNL with example projects to illustrate the successes and the lessons learned.

OAK RIDGE NATIONAL LABORATORY M&I

Weapons research facilities were established at the site of the ORNL in 1943 as part of the World War II Manhattan Project. ORNL's original mission was to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb. As its role in the development of nuclear weapons decreased over time, the scope of work expanded to include the production of isotopes, fundamental research in a variety of sciences, research involving hazardous and radioactive materials, environmental research, and radioactive waste disposal.

The vision for ORNL is to continue the ongoing research mission; therefore, cleanup goals will be to support controlled industrial use within the main plant area and unrestricted industrial use in surrounding areas. Figure 1 provides an aerial view of ORNL.

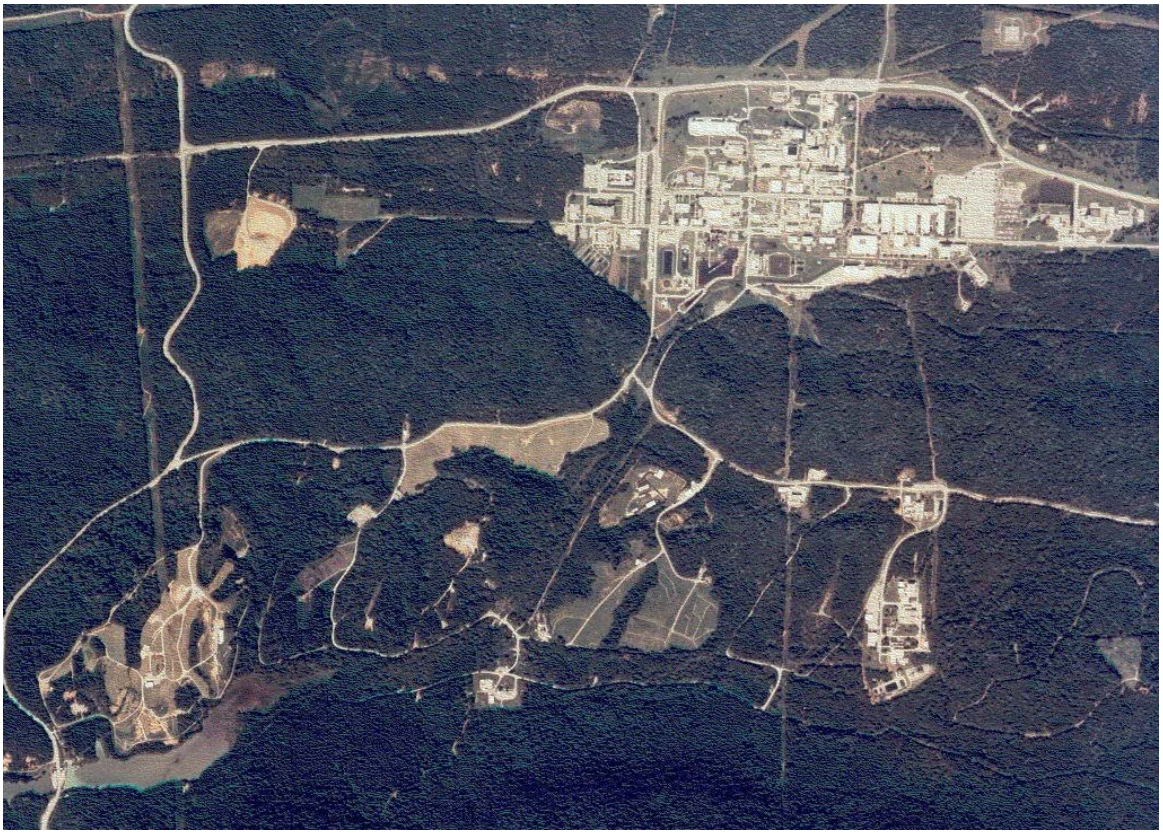

Fig. 1. Aerial View of Oak Ridge National Laboratory.

Key end-dates for major work scopes at ORNL include:

- Complete Remedial Action by Fiscal Year (FY) 2011
- Complete Decontamination & Decommissioning by FY 2011

To accomplish this, BJC had to divide the work into large projects with discrete scopes and defined end points to be achieved. It was decided that a large portion of the Remedial Action/Decontamination and Decommissioning activities could best be accomplished by awarding a Basic Ordering Agreement (BOA) to four companies that were qualified and provided the best value to the government. This allowed BJC to issue task releases to these companies who already had subcontracts in place addressing the general terms and conditions (T&C). This allowed the procurement documents to focus on the specifics for the task to be accomplished without revisiting the general T&C. This streamlined the procurement package thus expediting the site restoration activities and reducing the cost.

For projects that were considered more specialized (outside the scope of the BOA) or greater than $2M in value, the work would be an open competition for all pre-qualifying companies. Other tasks; such as waste management and surveillance and maintenance activities; were also bid to pre-qualified subcontractors that had the required experience, staff, and health and safety performance record for this type of work.

The following sections will address the different types of subcontract mechanisms, method of accomplishment, integrated team effort, and challenges that were overcome to achieve site

restoration goals for 2001. The projects highlighted are in the ORNL Main Plant Area as illustrated in Figure 2.

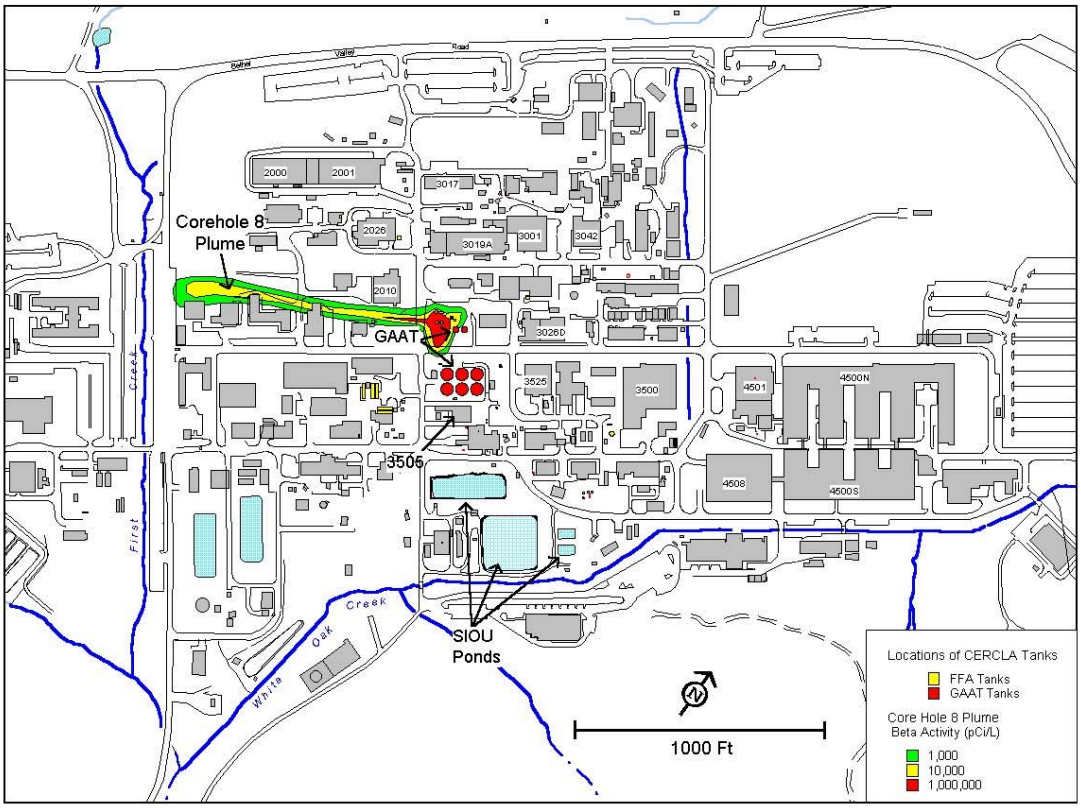

Fig 2. Oak Ridge National Laboratory Main Plant Area.

GUNITE AND ASSOCIATED TANKS

Beginning in the 1940s, the Gunite and Associated Tanks (GAAT) at ORNL were built to collect, neutralize, store, and transfer the liquid portion of radioactive and/or hazardous chemical wastes. The tanks vary in size and construction. Given the potential risks of the contaminants and the age of the Gunite tanks, the remediation of these has been a high priority.

UT-Battelle (formerly Lockheed Martin Energy Systems) and their subcontractors did not transition to a BJC subcontractor. Rather, BJC choose in April 1998 for the UT-Battelle Team to complete the "turnkey" sludge removal project they began in 1995 since the project was in the middle of executing and performing well. Robotics and remotely operated equipment are included in the 29 technologies that have been deployed to remove more than 86,000 gallons of transuranic mixed waste sludge from eight large underground tanks. The sludge removal activities (78,000 Curies total activity) were completed in September 2000 and the sludge is in storage awaiting onsite treatment and then disposal at the Waste Isolation Pilot Plant. The sludge removal activities were completed over a year ahead of schedule, but now the empty tanks required an expedited procurement to facilitate their remediation—stabilization in place.

GAAT stabilization was awarded via the RADD subcontract mechanism to SEC in March 2001 to complete the documentation and fieldwork necessary to achieve tank stabilization in accordance with the Action Memorandum. Tank stabilization activities began on April 23, 2001, and were completed one month ahead of schedule on August 31, 2001. Over 7400 cubic yards of grout were placed in these tanks stabilizing over 4,000 Ci of radioactive material in place. This schedule acceleration was the result of good pre-planning during pre-mobilization by working with BJC, grout vendor, and pumping company, and other subcontractors. This planning allowed refinement of the pump and hose system used to convey the grout and the formulation of the grout mixture. Because of expediting the work, additional activities could be accomplished at the GAAT site that resulted in complete site restoration to a paved area for future parking completed by September 30, 2001, at a savings of $1M a year ahead of schedule.

These combined remediation efforts (remedial design, regulatory documentation, sludge removal, tank stabilization, and site restoration) were $120 million under budget and seven years ahead of the original baseline schedule.

ORNL FEDERAL FACILITY AGREEMENT TANKS

Since its establishment, ORNL has operated numerous facilities that generate radioactive liquid low-level waste (LLLW). Waste solutions are typically collected in tanks located inside the research facility and discharged into below-grade collection tanks that receive LLLW from several different facilities. Most of the LLLW System was installed more than 40 years ago. The initial system and its modifications were designed to minimize radiation exposure to users and operators. As-built drawings for some of the older tank systems did not exist. The system includes features such as unvalved, gravity-drained transfer lines to prevent waste backup into generator areas; shielded pipelines and tanks; and provisions for remote operations to minimize personnel exposure.

The overall objective of the ORNL Federal Facility Agreement Tanks Project was to evaluate and remove the contents of 19 category D LLLW tanks to the extent practical and then stabilize the tanks by filling them with concrete. TPG Applied Technologies was awarded this work in 2001 and completed the following activities:

- Sludge removal and remediation of three of the remaining tanks
- Stabilized five tanks that do not require sludge removal
- Submitted a removal action report for the Balance of Tanks

CORE HOLE 8 GROUNDWATER PLUME

Core Hole 8 is the designation for a major contaminated groundwater plume at ORNL. The groundwater plume was discovered in the mid-1980s when a groundwater test well (Core Hole 8) revealed an underground plume of radioactive contamination from no apparent source. In 1985, sample wells were installed around the ORNL Main Plant Area to see what groundwater contamination was present. One well at First Street, which borders ORNL's west fence, had significant levels of strontium-90. It took years of investigation to isolate the source, which has been completed.

Three coordinated actions are now underway to stop the release of contaminants. The actions to control the Core Hole 8 contaminant plume and its source during FY 2001 include:

- Seepage intercept control
- Contaminant source control actions at Tank W-1A
- Pumping from wells in the plume to control flow and remove contaminant mass

IT Corporation was awarded a subcontract in FY 2000 to remove Tank W-1A and the surrounding contaminated soil. In the Spring/Summer 2001, a 40-ft by 50-ft by 20-ft deep excavation around the tank was excavated to expose the tank and piping while removing the contaminated soil. The majority of the soil has been packaged and shipped to Envirocare, but higher radiological contamination was encountered and the remaining soil will either have to be disposed at Nevada Test Site (NTS) or Waste Isolation Pilot Plant (transuranic soils). Thus, this project site has been placed in a safe mode awaiting decisions from stakeholders on how to proceed.

ORNL METAL RECOVERY FACILITY (BUILDING 3505)

The ORNL Metal Recovery Facility was a two-story, highly contaminated, deteriorating former nuclear fuel reprocessing pilot plant at ORNL with seven above-grade process hot cells used for the recovery of uranium and other materials from fuel and waste. The facility was constructed of concrete and steel in 1952 and taken out of service in mid-1980s. As part of BJC's Disadvantaged Business Subcontracting Plan, an HBCU/MEI was subcontracted to decontaminate, demolish, and dispose of the above-grade portion of the facility, and to stabilize the below-grade fuel transfer canal, process pits, sumps, and drains in FY 2001 to reduce overall risk at the ORNL. The Hemispheric Center for Environmental Technology at the Florida International University (FIU-HCET) was awarded the subcontract in April 2000 to complete the Building 3505 D&D. The method of accomplish included:

- Removal of building mechanical and electrical systems
- Decontamination of the facility to remove and/or stabilize loose surface contamination prior to demolition
- Demolition of the structure
- Stabilization of below-grade structures
- Capping of the slab at grade
- Waste disposal at Envirocare of Utah Facility

This facility is on the southern border of GAAT Site and required coordination with this project.

SURFACE IMPOUNDMENTS OPERABLE UNIT

The ORNL Surface Impoundment Operable Unit is composed of four surface impoundments that were excavated between 1943 and 1964 to serve as temporary radiological wastewater storage facilities. The bottoms of these impoundments have since become highly contaminated with various radionuclides and other hazardous substances. In addition, investigations and visual observations have confirmed that contaminants are escaping into the surrounding environment, a situation that presents risks to human health and the environment.

In FY1999, the two small impoundments containing only minor amounts of sediment and low-levels of contamination were excavated and the sites restored. In FY 2000, URS/Radian was awarded a lump sum contract to remove/dispose of the radioactive sludge from the two larger, highly contaminated impoundments and stabilize the site. In FY 2000, they completed the design and began construction of the process treatment system for the dredged sludge. Roughly 6500 cubic yards of radioactively contaminated sludge was dredged from the surface impoundments for treatment and disposal and one impoundment site restored. The remaining pond is being used to stage the sludge prior to treatment of the remaining sludge. Although twice the originally estimated volume was removed (10% of total estimated volume) and one of the impoundments was backfilled with rock and grouted, the project budget remains roughly $16 million below the original Record of Decision (ROD) estimate. In FY 2001, dredging of the sludge in the larger impoundments began followed by solidification of the sludge into concrete blocks for transport and disposal at NTS.

INTEGRATED TEAM EFFORT

As can be seen in Figure 2 above, the center of the ORNL Main Plant Area had multiple site restoration activities ongoing in 2002 that required an integrated team effort. The team included:

- Subcontractors directly involved with these projects
- BJC performing M&I contractor activities (surveillance and maintenance of nuclear facilities)
- UT-Battelle performing laboratory operations
- Waste management subcontractors performing routine operations

There were a total of five remediation subcontractors in the field at the same time in a three-block area. In addition to these remediation subcontractors working in this three block area, there were many routine operations being performed by others:

- Routine Surveillance and Maintenance
- Radiation Protection Program
- Low-level Radioactive Liquid and Gaseous Waste Operations
- Solid Waste Disposition
- Well 4411 Pump and Treatment
- UT-Battelle Laboratory Operations

SEC had over 750 grout trucks (16–20 per day) filled with 9 cy of grout that were required during GAAT field activities to stabilize the tanks, thus making daily traffic control and cooperation of others on site essential to meeting the aggressive schedule. IT Corporation had a large radioactive soil removal project associated with the Core Hole 8 Groundwater Plume in the northern portion of GAAT Site while HCET-FIU was performing Building 3505 D&D on the southern boundary of GATT Site. BJC's liquid waste operations subcontractor, Duratek Federal Services, removed the residual liquids from the tank and isolated the active systems from the tanks. UT-Battelle opened an access gate previously closed and unmanned, and then provided a guard for use by SEC's grout trucks to facilitate delivery of tank stabilization material.

BJC achieved team integration by facilitating the communication between multiple subcontractors and encouraging all to work together with the common mission of ORNL site restoration. Integration was to a point that when a large specialty forklift was needed for just one day on the GAAT Site that HCET-FIU loaned it to SEC, who was a lower-tier subcontractor, on each other's projects. BJC displayed all aspects of what DOE anticipated from an M&I Contractor by pulling all together to achieve the 2001 site restoration goals.

CHALLENGES

As expected with a program of this magnitude and complexity, there are a host of challenges and uncertainties. BJC remains committed to proactively resolving each of these.

- Executing the EM Program with flat budgets and obtaining adequate funding to accelerate the disposal of legacy low-level waste
- Meeting all regulatory commitments given funding constraints
- Disposing of radioactively contaminated metal given the metal recycle moratorium
- Assessing the budget, technical, and schedule impacts of transferring surplus facilities from Defense Programs and the Office Of Science to the EM Program

All of these challenges and uncertainties are surmountable, and a path forward for each is being developed.

CONCLUSION

Transitioning a cleanup program from an operations philosophy to a focused closure philosophy started with BJC senior management clearly articulating a credible closure vision. Frequent communication and outreach sessions with customers, employees, regulators, affected communities, and other stakeholders are paramount in importance. Along with the vision; management's ability to create and instill a culture that recognizes, rewards, and celebrates closure activities and not operations; is key to success. With the closure culture instilled, employees at all levels are better able and willing to focus every funding dollar possible on field cleanup, thus ensuring the success of the cleanup program. Even with a clear vision and a closure culture, to realize success, management must also deploy proven, state-of-the-art project management tools for the workers to facilitate the momentum toward achieving the closure vision. Finally, the support of the subcontract community is essential to the success of the M&I concept by also providing the same culture focused on closure with incentives.