

Managing Waste Inventory and License Limits at the Perma-Fix Northwest Facility to Meet CH2M HILL Plateau Remediation Company (CHPRC) American Recovery and Reinvestment Act (ARRA) Deliverables – 12335

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ABSTRACT

CH2M HILL Plateau Remediation Company (CHPRC) is a prime contractor to the U.S. Department of Energy (DOE) focused on the largest ongoing environmental remediation project in the world at the DOE Hanford Site Central Plateau, i.e. the DOE Hanford Plateau Remediation Contract. The East Tennessee Materials & Energy Corporation (M&EC); a wholly owned subsidiary of Perma-Fix Environmental Services, Inc. (PESI), is a small business team member to CHPRC. Our scope includes project management; operation and maintenance of on-site storage, repackaging, treatment, and disposal facilities; and on-site waste management including waste receipt from generators and delivery to on-site and off-site treatment, storage, and disposal facilities. As part of this scope, M&EC staffs the centralized Waste Support Services organization responsible for all waste characterization and acceptance required to support CHPRC and waste generators across the Hanford Site.

At the time of the CHPRC contract award (August 2008) slightly more than 9,000 cubic meters (m^3) of legacy waste was defined as “no-path-forward waste.” A significant portion of this waste ($7,650 m^3$) comprised wastes with up to 50 grams of special nuclear materials (SNM) in oversized packages recovered during retrieval operations and large glove boxes removed from the Plutonium Finishing Plant (PFP). Through a collaborative effort between the DOE, CHPRC, and Perma-Fix Environmental Services, Inc. (PESI), pathways for these problematic wastes were developed that took advantage of commercial treatment capabilities at a nearby vendor facility, Perma-Fix Northwest (PFNW).

In the spring of 2009, CHPRC initiated a pilot program under which they began shipping large package, low gram suspect TRU (<15g SNM per container), and large package contact and remote handled MLLW to the off-site PFW facility for treatment. PFW is restricted by the SNM limits set for the total quantity of SNM allowed at the facility in accordance with the facility’s radioactive materials license(s) (RML). While both CHPRC and PFW maintain waste databases to track all waste movements, it became evident early in the process that a tool was needed that married the two systems to better track SNM inventories and sequence waste from the point of generation, through the PFW facility, and back to the Hanford site for final disposition. This tool, known as the Treatment Integration and Planning Tool (TIPT), has become a robust planning tool that provides real-time data to support compliant and efficient waste generation, transportation, treatment, and disposition.

INTRODUCTION

As with any waste management process, a key to effective control of schedule and cost is processing facility throughput. Commercial facilities have not typically tracked or trended waste input and throughput with any consistency, and conversely, DOE waste generators have been even less thorough. The reasons for this are numerous, including differing criteria for defining waste volumes (e.g., pounds versus cubic meters), and differing methods for tracking waste activity limits (e.g., Nuclear Regulatory Commission versus U. S. DOE). Major drivers for these differences can be attributed to commercial facility licensing processes and state agreement for regulation with the NRC. Finally, the largest issue for reliable throughput modeling development is the DOE waste generator and the reliability of their funding for project performance.

For years, commercial processing facilities, and to a large extent disposers, had to take an approach that was geared to obtaining business when business was good. In other words, planning is not the most important issue when you cannot be certain that the business is going to be there next quarter, let alone the next fiscal year. You take what you can, when you can, from anybody that has it. It's survival mode.

However, this condition has created an issue on more than one occasion, and despite the very best attempts in maintaining good business relations, created difficulties for both parties. Waste generators will make every attempt to communicate with commercial suppliers when they think work will be happening and when services are necessary. As with any remediation project, the best in schedule planning, when dealing with many first of their kind decommissioning and waste generation processes, is only that; planning. The generated waste is usually late, or early, and since the processing facility must keep business moving, capacity limits become more of a game of roulette. If the facility has room on that day, you get in. If not, you don't. As such, waste generators are left many times with wastes that cannot be received at the processing facility and have to take alternative approaches to manage the waste until room under the license becomes available. Such actions may include project delays, interim storage, or taking chances to place waste into transportation hoping the facility opens in a quick fashion.

Each of these options for a generator can result in expensive cost impacts, and does not endear the processing facility to them. Crews remain idle, equipment is tied up, storage costs are incurred, and compliance risks are increased with the potential attendant cost impacts. Conversely, the processing facility is left to feel the ire of the customer and left not understanding why the customer cannot deliver waste when they planned. The battle, for lack of a better term, has been allowed to happen for a long time.

AMERICAN REINVESTMENT AND RECOVERY ACT (ARRA) DRIVES CHANGE

In 2009, CHPRC was the recipient of nearly \$1.3 billion in ARRA funding. A major portion of that funding, around \$350 million, was apportioned the Waste and Fuels Management Project (W&FMP). The primary goals of the investment were to accelerate processing and final disposition of TRU and mixed low-level (MLLW) legacy waste volumes. These waste included

a large volume of wastes that were deemed no-path-forward wastes due to the size of the packages, dose, some of it remote handled (RH) and the SNM content. The advantage was that the wastes were already in storage, accessible, and ready for processing. Original plans had been for these wastes to be processed through a multi-purpose facility built on the Hanford site. However, it had become the mission of the CHPRC and the DOE to make that facility unnecessary due to the proximity of the PFNW facility, and the cost avoidance associated with not constructing and operating a new facility. PFNW was built, available, and had the capabilities needed.

As stated, PFNW was the center piece of this strategy, and the initial processing operations were geared to address the lower gram wastes that could be more easily transported the thirty miles from the Hanford site Central Waste Complex (CWC) to PFNW. Of course, the mode of the day was to go as fast as you could. Pilot projects for large waste packages of TRU, MLLW, and RH waste were started in late 2009 and continued on through 2010. While some license limit ceilings were encountered, they did not create any real impact to the scheduled work. Additionally, the DOE had commissioned the Energy Facility Contractor Operations Group (EFCOG) Waste Management working group to examine all commercial facility limits and impacts of the expected ARRA waste volume increases. This work, including the commercial suppliers, indicated that sufficient capacity existed to meet the increased demand, and the contractors and processing facilities were confident there would be no issues.

Unfortunately, not all the right questions had been asked and reviewed. While overall capacity and limits seemed to be of little challenge, the real issue was timing and when those volumes and activities would be necessary. That question was not adequately considered, and in hindsight, probably never would have been, because the long held belief that the processing facility knew what they could do, and the generators had identified the quantities, volumes, and types of waste they anticipated. This projection held true with each side expecting the other to compensate as they always had. However, ARRA goals and objectives vastly changed that landscape due to the aggressive scope and timing required to meet the DOE mandates. That became very apparent in the early part of 2011.

Hanford site wastes had moved very effectively in 2009 and 2010 through the PFNW facility. So effectively that the CHPRC and DOE-RL revised targets for waste processing to include higher gram wastes, even larger waste packages, some in excess of 60 m³, and more TRU wastes from point of generation at the Waste Retrieval Project. PFNW was able to say they felt they could handle those increased volumes, including the attendant SNM quantities, under their license. But, two events occurred at nearly the same time that pressured the system and required change. First, the Plutonium Finishing Plant (PFP) ARRA goals came into jeopardy due to the time required to size reduce and package removed glove boxes on site. Insufficient personnel or time were available and increased output was required without loss of schedule or increased cost. These glove boxes were higher quantity SNM with some nearly as high as 30 grams. PFNW became the obvious choice to fill the gap and provide an alternative outlet for the scope. Second, the decommissioning work in the Hanford 300 areas also generated a series of glove boxes from the old laboratory facilities that were also high in SNM quantity. The original thought was that the PFP and 300 area boxes were higher priority and could be processed in sufficient time to allow for the next wave of large, high gram legacy waste packages. But the uncertainty of that

bet was more than the CHPRC and DOE-RL were willing to accept and a process had to be developed that could accurately predict the generator output, processing facility input, and with high confidence to support expenditure of funds to meet the revised ARRA processing goals, or to accept that the original goals were to be enough.

DISCUSSION

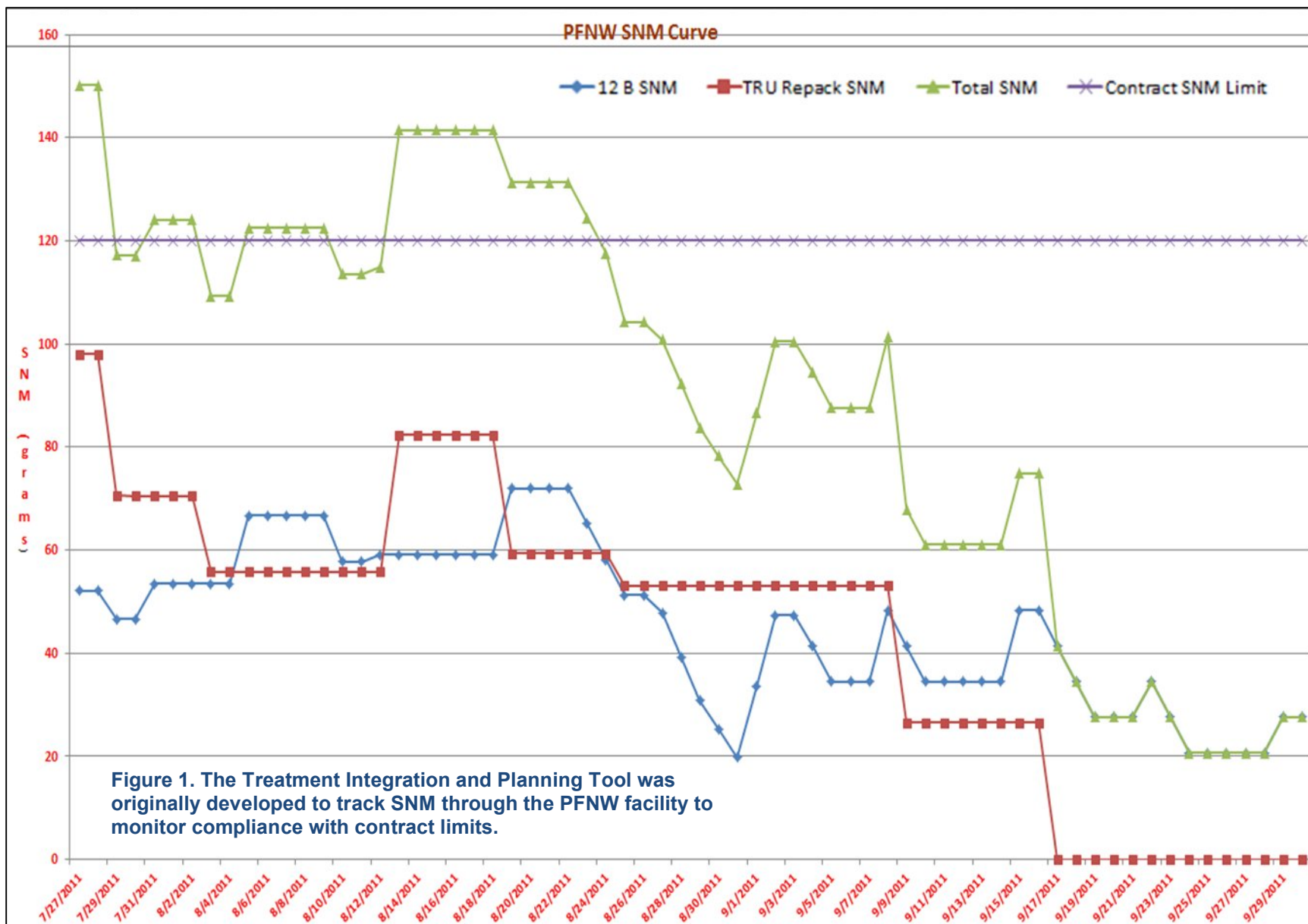
M&EC personnel had been originally developing the TIPT to track the processing of 7,560 m³ of suspect transuranic (TRU) waste from storage or point of generation; through treatment at PFNW; to return and final disposition at the Waste Isolation Pilot Plant (WIPP) or in onsite disposal facilities, as appropriate for the waste. The tool, while useful, was still primarily based on what was happening, not was going to happen, and what needed to be done to address issues. In other words, it was not yet a predictive tool. However, based on the above listed issues, and the need for both CHPRC and PESI to assure that both parties could succeed, a radical change in the tracking process was needed. Predictive aspects needed to be added to the tool.

M&EC personnel, along with CHPRC and PFNW resources began to examine closely the defined needs, schedules, and licensing limits. The issue was that the tools available, and being used, were disjointed, did not interface well, and neither party had the time, money, or energy to develop new predictive tools that could marry the needs into one tool. But a reliable, predictive tool was what was required and needed to be developed. M&EC personnel were in the unique position to assess both sides of the issue in that the WSS group was responsible for characterization of the wastes heading for processing and treatment, as well as the approval group for the return of segregated TRU and treated MLLW for final disposition on the site. A simple, innovative solution was necessary to address the problem and give all parties a tool they could use to drive efficiency and avoid cost increases, or schedule loss. As such, an existing tool modification was what was needed.

Critical factors that drove development of the modified tool included:

- Potential for up to 50 grams of special nuclear materials (SNM) per waste package
- PFNW's radioactive material license limits for SNM (200 grams of Plutonium)
- CHPRC/M&EC contractual limits of 120 grams of SNM at one time at PFNW
- Managing SNM and volumes to treatment without interfering with PFNW commitment to other waste generators
- Scheduling and tracking resources for transporting wastes to and from PFNW, as well as CHPRC resources to finally disposition the returned wastes
- CHPRC/M&EC Key Performance Parameter (KPP) goals to repackage 850 m³ of TRU waste by September, 30 2011
- The tool needed to be simple and easy for everyone to use and understand
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The TIPT is an Excel®-based spreadsheet that tracks required resources, scheduled shipments, SNM quantities, receipt and each processing step at the PFNW facility, as well as waste returns and disposition. As shown in Figure1, using TIPT it became apparent that CHPRC exceeded both the contractual limits as well as the facility RML limits for SNM during the first months of project execution which necessitated that PFNW negotiate with the State for exemptions to their RML. It further impacted PFNW's ability to accept additional waste containing SNM from both



CHPRC and other customers. It was also apparent that based upon the challenges coming, that need was entirely probable again, and exemptions signaled further delay, as well as a display to regulators that the planning process was flawed and unreliable. Based on early data and in order to maintain RML and contractual compliance, M&EC began further refinements of TIPT to allow CHPRC and PFNW to better predict sequencing of waste into the facility, define issues before they impacted the project, and in general process the waste based on maintaining throughput rather than using the traditional first in, first out methodology. Figure 2 shows the parameters that are tracked using TIPT to ensure compliance. It was decided that with the addition of some readily available data, and further integration of that data into the TIPT, a more reliable predictive tool could be had. This required that generator projects better predict volumes and activity to be added to the TIPT, and then that data could be added into a transportation field that would allow the TIPT to integrate loading options. This was not necessarily a big problem for the generator, since the planning process for funding already required this information, as well as the waste forecasting systems for the Hanford site. It was just a different application of data usage. Additionally, the processing facility already had an idea as to how long each waste type and package would take to process and this information could be integrated into the TIPT tool to depict when wastes could be expected to be ready for return from the processing facility. Most importantly, the revisions to the TIPT now provided a predictive capability to CHPRC to assess and manage inventory projections to determine the most reasonably manageable feed streams into the commercial facility. The tool is also valuable in that CHPRC, along with the DOE, are able to include other Site contractors into the planning processes and use this to allow DOE to evaluate Site priority, and assure the facilities are able to process material in a timely and effective manner, as well as allowing generators to determine when, or if, a project should begin. While this is not always optimal from a material handling stand point, it acknowledges and manages the reality of problems as they arise.

The usefulness of the revised TIPT was validated during the spring and summer of 2011 as the wastes from PFP, 300 areas, legacy storage, and point of generation suspect TRU were all successfully scheduled, processed, and returned for final disposition. This included an additional 475 m³ of large package suspect TRU and RH MLLW, nearly 300 m³ of additional point of generation wastes from the Waste Retrieval Project, 10 high gram glove boxes from the 300 area laboratories, and 20 glove boxes from the PFP decommissioning project. Some of these projects required planned staging of wastes to avoid license impacts, but with the revised TIPS tool, schedules could actually be set to move wastes and avoid major project impacts, as well as PFNW license overloads. It is important to note that this predictive capability provided such an advantage, that all these wastes were able to be prepared, transported, processed, and returned within the requirements of the ARRA funding direction, with nearly all wastes completed in a little over 9 months.

As a further demonstration as to the viability of the tool improvements, another issue was added in the late summer of 2011. This involved managing waste from the demolition of the Hanford 209E facility, another activity funded under the ARRA. During facility characterization a series of tanks were found that were used in the criticality laboratory section of the building. It was believed that these tanks had been thoroughly flushed many years ago; however, during characterization it was discovered that the tanks were highly contaminated and still contained a significant amount of SNM. Since the facility was already in demolition, stopping to handle the

Program Information						Shipment Information		Processing				NDA			
CHPRC Shipment #	PFHW Receipt #	Applicable WBS	PI KPP	Current Status	Issues	Ship	Receipt	ECD	Start	PD	Complete	ECD	Campaign	Start	Complete
TC072	MWR11-169	209E	209E	Complete	NONE	7/6/11	7/8/11	7/26/2011	7/19/2011	7.00	7/21/2011	N/A	N/A	N/A	N/A
TC059	MWR11-147	M-91-44	200m3 POG PI 2000m3 KPP	Return Shipment Prep	Received Direction to Return Mass Balance	6/22/11	6/24/11	8/2/2011	7/21/2011	12.00	8/2/2011	8/16/2011	P036	7/22/2011	8/12/2011
TC060	MWR11-141	M-91-44	200m3 POG PI 2000m3 KPP	Processing	NONE	6/15/11	6/17/11	8/3/2011	7/25/2011	9.00	8/11/2011	8/17/2011	P037	8/1/2011	8/4/2011
TD003	LLR11-015	#N/A	PI Related	Grouting	One drum transferred to MW for treatment	2/3/11	2/5/11	8/9/2011	7/26/2011	14.00		N/A	N/A	N/A	N/A

TRU Return					MW/LLW Return				
ECD/Complete	PFHW Prep. (CDs)	Acceptance Review	Ship Date	Ship Numbers - Percents	ECD/Complete	PFHW Prep. (CDs)	Acceptance Review	Ship Date	Ship Numbers - Percents
7/28/2011	7/22/2011	7/26/2011	7/28/2011	TR128 - 100%	N/A	N/A	N/A	N/A	N/A
8/18/2011	8/4/2011	8/12/2011	TBD 8/16/2011	TR127 TR131	N/A	N/A	N/A	N/A	N/A
8/24/2011			8/25/2011	TRXXX	8/31/2011				
N/A	N/A	N/A	N/A	N/A	9/2/2011				

Container/Shipment Information											
PIN	Waste Type	Originating Location	Volume (m3)	Package Size (L x H x W)	Licence	SNM (g)	% @ PFHW	SNM on Licence	Shipment Type	Conveyance	Comments
209E-TK-160	TRU Mixed Legacy	209E	3.65	Glovebox	M	1.29E+01	100%	1.29E+01	CE-SPA	Cruiser #433	(Road Closure) 13g SNM
755-DMA02 (Box 18)	TRU Mixed Legacy	WRP (3A)	32.621	16.5*7.1*5.2	M	2.30E+01	100%	2.30E+01	R-SPA-2	Super-7A (TEREX Trailer Std. W. Deck)	POG (Road-Closure) (1.3Ci Am-241)
755-DMA01 (Box 20)	TRU Mixed Legacy	WRP (3A)	38.058	12*10.7*10.5	M	6.33E+00	100%	6.33E+00	R-SPA-2	Super-7A (TEREX Trailer Std. W. Deck)	POG (Road-Closure, travels with SC094)
15 Drums	TRU Drop-out Virtual Shipment	N/A	3.33	55 Gallon					N/A	N/A	Waste From:

Figure 2. TIPT provides real-time data on each shipment, from the time CHPRC schedules the shipment, through return to the Hanford Site. TIPT is currently being expanded to include data from the point of generation, through final disposal.

tanks in field was out of the question. Further, the PFNW facility was already committed to other waste streams and did not have sufficient capacity in their SNM inventory to accept the tanks. TIPT was used to project when the tanks could be processed, presented to DOE and funding and schedules were adjusted to assure the tanks could be processed to meet limitations on use of available ARRA funding. The tanks were removed and packaged for transport, but were placed in interim storage until the waste could be moved safely to the PFNW facility beginning in late calendar year 2011. This ability kept the project on schedule for demolition, and assured funds remained for processing of all the ARRA waste materials, as well as allowing the CHPRC and PFNW to strategically determine the best use of resources and funds to meet the emerging need.

CONCLUSION

TIPT is developing into the next generation tool that will change the way in which legacy wastes, retrieval wastes and decontamination and decommissioning operations are conducted on the Plateau Remediation Contract (PRC).

The real value of the TIPT is its predictive capability. It allows the W&FMP to map out optimal windows for processing waste through the PFNW facility, or through any process that is in some way resource limited. It allows project managers to identify and focus on problem areas before shipments are affected. It has been modified for use in broader applications to predict turnaround times and identify windows of opportunity for processing higher gram wastes through PFNW and to allow waste generators, site-wide, to accurately predict scope, cost, and schedule for waste generation to optimize processing and eliminate storage, double handling, and related costs and unnecessary safety risks.

The TIPT addresses the years old problem of how to effectively predict not only what needs to be done, but when. “When” is the key planning parameter that has been ignored by the generator and processor for many years, but has proven to be the most important parameter for both parties. While further refinement is a natural part of any development process, the current improvements on the TIPT have shown that prediction is a powerful consideration. Even in lean times expected for the foreseeable future, the improved TIPT continues to play a central role in managing our way through those times to assure facilities remain viable and available.

It is recommended that other major remediation projects and waste processing facilities incorporate a tool such as TIPT to improve customer-commercial supplier communications and better optimization of resources.