

**Privatization and Outsourcing Storm Water Discharge Requirements:
Simplification Through Automated Sampling**

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ABSTRACT

Kelly Air Force Base (KAFB) is a large industrial complex that is currently undergoing a Base Realignment and Closure (BRAC) action. Privatization is occurring concurrently with the base closure and realignment. The base maintains both two Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) and two Texas Natural Resource Conservation Commission (TNRCC) storm water discharge permits. Kelly AFB installed a system of automated storm water monitoring samplers and flow meters for its eight storm water outfalls to effectively manage the requirements of the permits. Maintenance, operation and handling of compliance issues through monitoring, sampling and reporting were directly contracted to Roy F. Weston, Inc. (WESTON®).

With the conveyance of real property to both the private sector and other Air Force agencies, the liability associated with the permits will also be conveyed. This paper describes Kelly AFB's approach to storm water monitoring and provides insight into how the base has met storm water monitoring compliance requirements while reducing the manpower dedicated to this program. Through Kelly AFB's pioneering and subsequent contracting of workload to WESTON®, the assumption of the role of permittee is simplified and the privatization of the base expedited.

INTRODUCTION

The realignment and conversion of Kelly AFB has been labeled by the Air Force Base Conversion Agency (AFBCA) as "the most complex BRAC action ever." The primary challenge involved in the BRAC activities is the simultaneous realignment, closure and privatization of current operations. The depot workloads are distributed through public-private competition, demanding a need for compromise and sacrifice by both sectors. A joint use agreement is needed for the air field which is to remain under Air Force ownership and control. There are Air Force missions that will continue at the base until 2001, and these need to be maintained while propagating closure and realignment. Thus, Kelly AFB is a site of interim use and early redevelopment; what AFBCA calls an "ultimate redevelopment to stimulate and support commercialization." The industrial capacity of Kelly AFB is to be utilized to maximize the potential of the facilities and workforce, bridging the gap between closure and realignment/conversion, while providing for minimal interruption of workload operations. This unprecedented BRAC action has Kelly AFB forging new ground, discovering original solutions, and taking an exemplary role for other organizations that may incur BRAC activities.

ORGANIZATIONS INVOLVED

When Kelly AFB was identified for a major base realignment in the *Defense Base Closure and Realignment Commission, 1995 Report to the President, 1 July 1995*, the coordination between Kelly AFB and AFBCA began. Three organizations were identified as participants in the BRAC action upon its approval on 28 September 1995: Kelly AFB, AFBCA, and the Greater Kelly Development Corporation (GKDC).

Kelly AFB and its tenants, under command of the San Antonio Air Logistics Center (SA-ALC), must continue to meet the requirements of their respective missions. The Air Force plans for and disposes of all surplus property and transfers excess property to other federal entities. In this case, the SA-ALC determined areas of Kelly AFB that will be realigned to Lackland AFB. The Air Force coordinates Reductions in Forces (RIFs) to downsize the workforce in accordance with the decrease in workload that the service is responsible for. This shift of worktasks is accomplished by the public/private bidding competition. Current examples include Boeing's Aerospace Support Center at Kelly AFB, and the more recent awarding of the propulsion business area to Tinker AFB, OK. Environmental compliance programs are transferred from the Air Force to new owners/tenants. The oversight is conducted by the base Environmental Management (EM), but as the liabilities for the related permits are changed from the Air Force to another entity, the corresponding compliance tasks also change hands.

AFBCA is a national implementing agency stemming from the Department of the Air Force. AFBCA conducts oversight of the lease agreements that come out of the realignment and closure. AFBCA works with the GKDC by a cooperative agreement in order to coordinate efforts to expedite closure and realignment of a base while looking out for the Air Force's best interests. A cooperative agreement is a special form of grant in which the awarding agency, Kelly AFB in this case, exercises a significantly higher level of involvement than in ordinary grants by provisions promulgated in Section 32 CFR Part 33. AFBCA determines that property is environmentally suitable for transfer or lease by deed under CERCLA §120(h) based on an environmental baseline survey. Those areas which cannot be documented as suitable are remediated. Kelly AFB is initially responsible for remediation of the Air Force sites, however, once Kelly AFB is officially closed, AFBCA has responsibility for long term remediation.

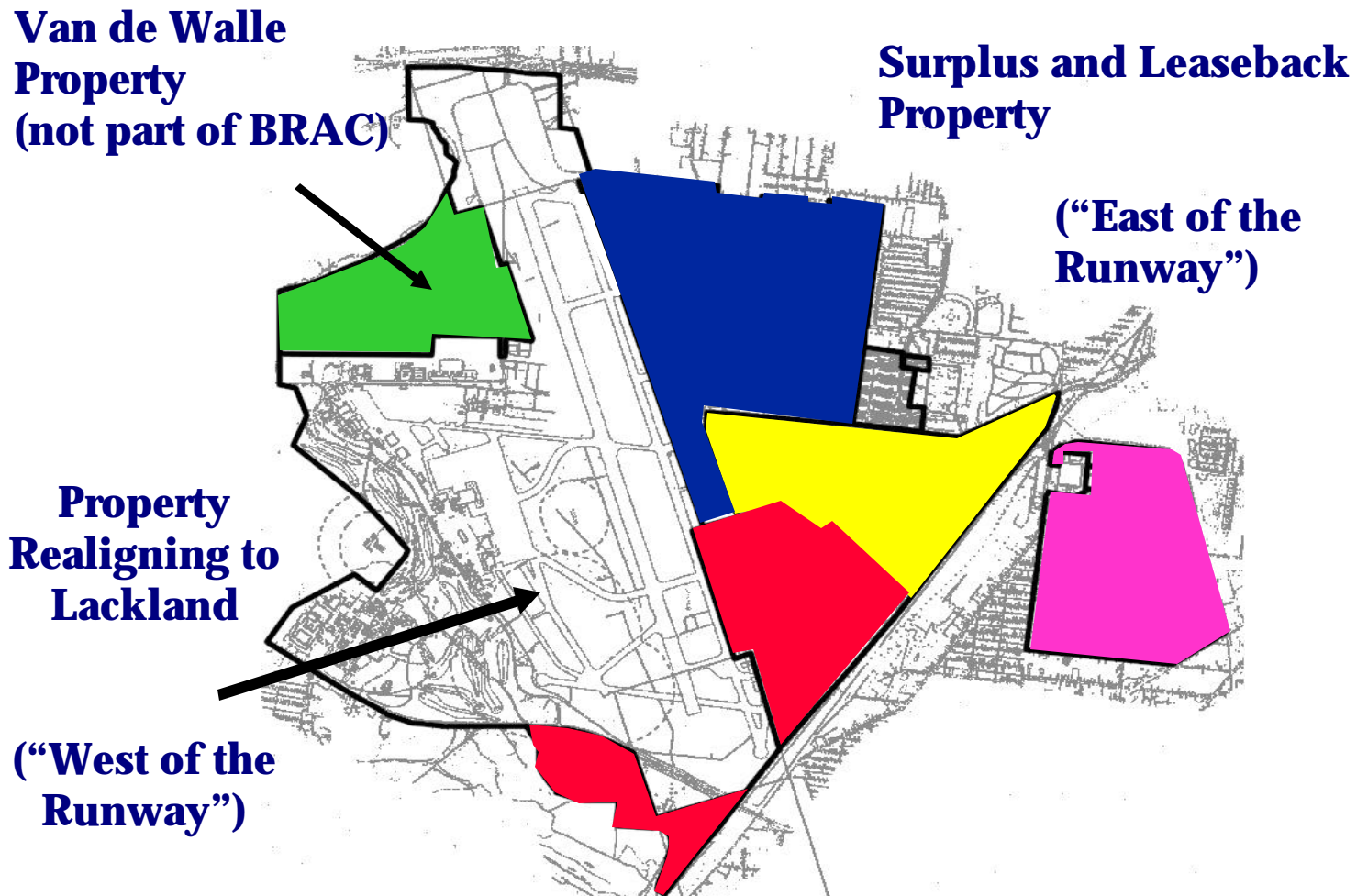
GKDC is charged with the redevelopment of land that the Air Force makes available for transfer to a tenant or leaseback to the government. GKDC oversees the tenants and their contractors, assisting their transition and providing services such as being a mediator to the government. More services are being transferred from the Air Force to GKDC - the most prominent being the utilities for the base. An uninterrupted transition is necessary, as well as a continuing responsibility to provide utilities for the Air Force as well for a fair price.

THE BRAC ACTION AT KELLY AFB

The end goals of the BRAC process are expedited by the unprecedented approach the government and community are taking towards Kelly AFB. The DOD missions are either realigned or disestablished, phasing out the latter while continually supporting the former. The community is active in developing and implementing the redevelopment plan, so the Air Force activities reflect the interests of both groups.

Negotiations for transfer were initiated in December 1996 and concluded in June 1997 with GKDC submitting an application for all but three acres of the surplus and leaseback property within Kelly AFB, including all utilities. An economic development conveyance was signed on 24 July 1997 for \$108 million. The Air Force and GKDC entered into a cooperative agreement to currently include East Kelly AFB and the entire industrial area of main Kelly AFB. This summer, coincident with an upcoming RIF, the utilities that are not already transferred, and the rest of the base not to be realigned, will be included in the cooperative agreement (See Figure 1 below).

Figure 1



Stormwater is a utility that is a concern for both AFBCA within the realigned portion of Kelly AFB, and for GKDC surplus and leaseback property. Not only do these organizations have individual responsibilities, but the nature of drainage basins and their lack of adherence to property lines causes a concern over coinciding interest in storm water outfalls.

The designation of a permittee for an outfall is based upon the major contributor to the drainage basin to that outfall. Certain drainage areas that will become the responsibility of GKDC must flow across the airfield to reach their outfalls. With the Air Force retention of the air field and corresponding clear zone, there is concern over the responsibilities and liabilities with this dual occupancy of the drainage area. Currently, a memorandum of agreement is being drafted to address the upkeep and maintenance of the storm sewer system. The proposal is for the main responsibility for upkeep and maintenance to be placed upon the organization who has the permit corresponding to the outfall in question, with easements assigned to address concerns involving the other party's property. Permit compliance is viewed as the primary driving force in the storm sewer system transfer.

Due to the extensive industrial nature of activities conducted throughout Kelly AFB, the base was required to obtain coverage under both the EPA and State storm water discharge permits. Under these permits, Kelly AFB is required to monitor storm water runoff from eight outfalls spread over a 3-mile radius. In 1997, the Air Force prepared for the closure and realignment by separating out into a new set of permits those outfalls to be retained by the government. Until the official transference of the older set of permits, Kelly AFB is responsible for all four permits, despite reduction in forces and funding. This is a major concern, as noncompliance can result in fines and penalties of up to \$25,000 a day.

On 14 September 1998, TNRCC officially assumed the NPDES program, giving them lead responsibility for all compliance and enforcement issues under the Clean Water Act. The assimilation of the NPDES permits into the TNRCC permits has not been presently accomplished, and may serve to make transference issues more confusing as they make reporting issues simpler.

Another factor which obfuscates the viewing of the permits is the fact that discharge from the base waste water treatment plant – the Environmental Process Control Facility (EPCF) – and Groundwater Treatment Plants (GWTPs) are also included in the storm water permits. The EPCF is to be transferred to the public sector along with the storm water outfalls corresponding to the non-realigned portions of the base under the directions of GKDC. On 17 February 1999, the San Antonio Water System (SAWS) revealed their plan to obtain the utility systems at Kelly AFB, to include the industrial waste collection systems (IWCS) and the EPCF. However, SAWS does not wish to be responsible for the storm water sewer systems that are included in the non-realigned portion, nor the sections of the permit which correspond to those storm water outfalls.

In order to operate any industry on base, regardless of designation, operation or ownership, a storm water permit is needed. The impact that the responsibility for adherence to the permit regulations must be thoroughly understood for a number of reasons. Assurance of a smooth transfer of not only permit ownership is needed, but also an uninterrupted transfer of permit compliance responsibilities. Compliance responsibilities, *e.g.* sampling, analyses, recording and reporting, must continue to be addressed in accordance with permit requirements throughout the transfer.

To maintain compliance with their storm water discharge permits, Kelly AFB implemented an automated storm water sampling system at each of the eight outfalls situated on the base. This automated system facilitates the collection of storm water samples (discrete and composite) at multiple locations during a single storm event. This system allows for routine downloading of real-time data without the errors associated with manual data collection and processing. Flow-data management software allows programming of flow meters, rain gauges, data loggers, scheduling of remote interrogations, retrieval of on-line status readings, interrogation of meters and transfer of data. This software also provides the ability to generate numerous reports and graphs from the collected data, thus enabling Kelly AFB to review real-time data for compliance.

Since Kelly AFB's installation of this system, the base has been able to meet all their storm water discharge monitoring requirements and has relieved limited manpower resources for other important program tasks. This automated sampling system will be included in the federal related personal property transfer which will accompany the real property transfer of the storm water outfalls and storm sewer system. Federal real property is defined as right, title or interest in land, including improvements, structures and fixtures. Federal related personal property is any property except real property and is an integral part of the real property, which is related to, designed for, or specially adapted to the functional capacity of the real property. The simplification of the sample and data collection process lessens the impact upon the organization assuming accountability for the permit. The entire compliance process, from monitoring through reporting, has been under direct contract to WESTON® for over three years, thus setting precedent for a public entity to address the permit criteria.

MONITORING REQUIREMENTS

When collection of 24-hour composite samples became an integral part of discharge permit requirements, the casual method of sampling storm water with a can on the end of a stick quickly became obsolete. Kelly AFB's discharge permits require the collection of discrete samples and composite samples, along with outfall flow rate and total runoff volume, at each of the eight storm water outfalls.

The collection of discrete samples at each of these outfalls during a single storm event poses a potential manpower and logistical problems associated with the collection of composite samples

at each outfall during the same storm event. These types of monitoring requirements, which are outlined in Kelly AFB's EPA and TNRCC storm water discharge permits, significantly influenced their selection of automatic storm water samplers and flow meters to satisfy their monitoring needs. Kelly AFB's implementation of automatic storm water sampling systems at these outfalls facilitated the storm water monitoring program by not only satisfying permit requirements but also by reducing the programs overall labor effort.

SYSTEM CONFIGURATION

Kelly AFB selected and installed ISCO-manufactured automatic storm water collection systems at each of the eight storm water outfalls in order to comply with EPA and TNRCC non-point source discharge permit requirements. The component equipment functions as an integrated storm water collection system such that storm water samples are collected and controlled automatically, either remotely, or from a central processing location; and such that samples may be collected on the basis of rain, flow, time, or factors thereof.

Component items in this integrated system include:

- Flow Measurement System (FMS);
- Sample Collection System (SCS);
- Rain Measurement System (RMS);
- Cellular Telephone System (CTS);
- Solar Power System (SPS);
- Operating System (OS);
- Necessary appurtenant interconnecting cables and system hardware;
- and, a pressure-tested instrument enclosure.

Kelly AFB utilizes this integrated system to:

- Measure and record rainfall amounts;
- To measure and record storm water flow in open channel flow conditions;
- To retrieve, process, and/or alter collection data and parameters remotely;
- and, To collect discrete and/or composite water quality samples at pre-selected user-defined flow or time based increments, or factors thereof.

The following summarizes the functional characteristics of the aforementioned systems which comprise the storm water collection system present at each of the eight storm water outfalls at Kelly AFB.

- Flow Measurement System (FMS) - The primary functional component of the FMS is the ISCO Model 4230/4250 flow meter. The FMS measures and records runoff level, and computes instantaneous flow using an established level to flow rate conversion for the

various open channel flow conditions at each outfall at Kelly AFB. The FMS stores collected and computed data which can be retrieved via a personal computer, modem, and the system compatible software entitled Flowlink.

- Sample Collection System (SCS) - The primary functional component of the SCS is the ISCO Model 3700 automatic storm water sampler. The SCS, on an automatic user selectable/programmable basis, measures and distributes a storm water sample to a bottle, or sequence of bottles, by activation from the FMS. The SCS calculates and delivers sample volume based on liquid detection and a revolution counting mechanism associated with a peristaltic pump. The SCS collects discrete and/or composite storm water samples based on user defined input and is capable of distributing samples into 1 to 24 bottles, or any combination thereof.
- Rain Measurement System (RMS) - The RMS allows rainfall to enter through an orifice and flow through a funnel to a tipping bucket. As rainfall is collected, the bucket tips and provides a contact closure to the FMS which monitors and records the rainfall level.
- Cellular Telephone System (CTS) - The CTS provides cellular access to the remote location flowmeter via a personal computer, modem, and Flowlink.
- Solar Power System (SPS) - The SPS provides power at each outfall to the FMS, SCS, and CTS. Each outfall is also equipped with a deep-cycle marine battery as a reserve power source.
- Operating System (OS) - The primary functional component of the OS is the ISCO developed software Flowlink. Although Flowlink is sometimes considered a data management software, it also performs many other tasks:
 - Programming flow meters and auto samplers to begin a sampling routine based on rainfall, flow, time, or any combination thereof;
 - Retrieving real-time status readings from flow meters;
 - Interrogating flow meters and samplers, and transferring their stored data to files in the personal computer;
 - Importing flow-conversion tables and exporting data as ASCII text;
 - Editing readings to correct errors caused by clock drift, daylight savings time, or miscalibration;
 - Scheduling remote interrogations and printing jobs;

- Generating reports and graphs of the data;

SYSTEM OPERATION

The storm water collection system present at each of the eight storm water outfalls at Kelly AFB integrates the separate components aforementioned in the System Configuration section. Each collection system is equipped with an FMS to monitor the instantaneous flow at each outfall. This monitoring has a twofold purpose: 1) complying with discharge monitoring requirements; 2) ascertaining if predetermined criteria has been met to warrant storm water sampling, and therefore enable the SCS. The criteria which may be utilized from the FMS to determine if the SCS is to be enabled include level, flow, velocity, rainfall, pH and dissolved oxygen (D.O.). The rainfall data is directly linked to the FMS via the RMS. The level, flow and velocity is connected to the FMS via an area-velocity sensor; and the pH and D.O. are connected to the FMS via a parameter sensor.

The microprocessor-controlled circuitry in the FMS stores the user programming instructions as well as collecting and storing the data registered from the sensors. A real-time comparison of the program and the data allows for triggering of the SCS as the predetermined criteria has been met to warrant storm water sampling. Kelly AFB realizes a storm water event when rainfall in a 24-hour period exceeds 0.1 inches, and when the flow rate of discharge through the outfall subsequently exceeds 100 gallons per minute (GPM). With the various parameters monitored by the FMS, logical conditions can be programmed to enable the SCS under the exact conditions permitted.

Once the programmed conditions are satisfied, the microprocessor-controlled circuitry of the SCS is enabled. The SCS can begin a sample event as soon as the FMS enables it, or at an interval designated from the time of initiation. Sample types are characterized by sample pacing. There are two types of sample pacing: time-pacing and flow-pacing. In time-paced sampling, the interval between samples is a time interval. In a flow-paced sampling, the interval between samples is a certain volume of liquid which has passed a measuring point in a flow stream.

The sampling routine begins with the SCS. The distributor arm of the SCS moves to the bottle which is to receive the sample, the pump rotates in the reverse direction for the pre-sample purge, then the pump rotates in the forward direction to fill the suction line up to the liquid detector. After the suction line has been filled to the liquid detector and liquid has been detected, the sample volume measuring begins until the programmed volume of liquid has been delivered to the appropriate sample bottle. The pump then rotates again in the reverse direction for the post-sample purge. The cycle continues if a time or flow paced sample is to be taken in either a sequential or composite form.

The OS can be a primary component of the programming for the FMS and SCS. The operating conditions can be entered via Flowlink, as well as the data acquisition and storage to

collect blocks of data. Flowlink allows storage and interpretation of the flow meter data. Reports can be generated in table or graph format, and the historical data can be exported in ASCII format.

If a CTS is used in conjunction with the OS, most primary functions of the FMS can be manipulated remotely, as well as the interface between the Flowlink and FMS. An internal modem in the FMS is relayed by a modem line to a personal computer, as opposed to direct connection interface with a portable computer taken to the monitoring station at the outfall. Considering the activity involved in traveling to and directly manipulating the FMS and SCS, made especially inconvenient if in fact there is a simultaneous storm event occurring, the remote access effectively frees limited manpower resources. With storm events that are borderline with respect to meeting the predetermined conditions, it is greatly convenient to be able to retrieve real-time status readings from the FMS, as well as take advantage of the feature which, through the CTS, calls a pre-programmed telephone number when the SCS is enabled. This informs the system operator that the sample condition has been met by the storm event and the sampling routine has begun. Electricity is provided at each storm water monitoring station to power the FMS, SCS and CTS. This is achieved through a direct AC line run from a breaker box connected to a live main on Kelly AFB. When this approach is not feasible, a SPS is utilized to collect and provide electricity. The constant power requirements of the FMS and the interval power draw of the CTS can be provided directly from the SPS with mostly cloudy to clear conditions. A trickle charge is employed to keep a deep-cycle marine battery charged for night conditions and when a larger power draw is required.

RECORDING AND REPORTING

WESTON® amasses analytical results of sample collection and monitoring data from Flowlink, combining all the elements into the monthly status self-reporting forms for both the State and Federal permits. Currently both the Federal Discharge Monitoring Reports (DMRs) and the State Monthly Effluent Reports (MERs) are being sent to and reviewed by TNRCC. A comprehensive tracking system is in place at Kelly AFB that encompasses air, water, and solid waste emissions. Within this software is the ability to compile water data, import into a customized form, and print out a complete DMR or MER. Each water sample can be documented along with its corresponding analytical data. Searches and tables can be compiled by constituent, outfall, date, and a number of other data fields. The possible future submission of electronic forms to regulatory agencies can streamline operations for both the permittee and the agencies.

CONCLUSIONS

As a result of the advent of the NPDES storm water permit program, and subsequent State regulated NPDES permit programs, the monitoring and controlling of storm water runoff at industrial facilities became not only necessary but also required. This posed a storm water monitoring problem to industrial facilities, like Kelly AFB, that contained multiple storm water outfalls and complex discharge permits. The casual approach to monitoring storm water was no longer a viable option. Kelly AFB responded to the storm water monitoring regulations by implementing an automated storm water collection system at each of the base's eight storm water outfalls. Since Kelly AFB's installation of this system, the base has been able to meet all its storm water discharge monitoring requirements and has freed limited manpower resources for other important program requirements is required.

In order to operate any industry on base, regardless of designation, operation or ownership, a storm water permit is needed. The impact that the responsibility for adherence to the permit regulations must be thoroughly understood for a number of reasons. Assurance of a smooth transfer of not only permit ownership is needed, but also an uninterrupted transfer of permit compliance responsibilities. Compliance responsibilities, *e.g.* sampling, analyses, recording and reporting, must continue to be addressed in accordance with permit requirements throughout the transfer. The assumption of the role of permittee is simplified and the privatization of the base expedited through Kelly AFB's pioneering in the area of storm water monitoring and collection and subsequent contracting of workload to WESTON®.