

# OVERCOMING MURPHY'S LAW TO GAIN ERP - A CASE STUDY AT GIBBONS CREEK LIGNITE MINE, TEXAS<sup>1</sup>

by

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**Abstract:** As of January 1997, there are 2,586 acres of reclaimed land in the Extended Responsibility Period (ERP) at Gibbons Creek Lignite Mine, Texas. This achievement has taken approximately five years to accomplish - from 1991 to 1996. During this period, there were a number of issues, some of which appeared to follow Murphy's Law (whatever can go wrong, will go wrong!). For example, the ERP candidate areas were split among three permit areas, which first had to be consolidated to facilitate the ERP process. Minesoil issues, identified as ERP prerequisites, became entangled in an overall renewal/revision of the newly-consolidated Permit 26B. Special-purpose vegetation studies were performed to investigate the effects of different minesoil textures. In the meantime, small depressional areas, wetland/wildlife enhancement areas, reclamation ponds and restored drainages became the subjects of attention from landowners and regulatory agencies. Some of these structures and features were subsequently reclaimed; others were approved via the permitting process. In some cases, the only way out of the impasse was through land acquisition. Finally, after all these issues had been resolved, an unforeseen oil-well drilling program criss-crossed the proposed ERP areas with a network of oil well pads and service roads, requiring a post-mining land use change. Eventually, whatever could go wrong, went right, and entry of lands into ERP was accomplished.

Additional Key Words: bond release, reclamation planning.

## Introduction

A key step in the reclamation process towards final bond release of surface coal mines in Texas is acceptance by the state regulatory authority (the Railroad Commission of Texas - RCT) of the reclaimed lands into the Extended Responsibility Period (ERP). This is a minimum 5-year period (areas with more than 26.0 inches average annual precipitation, and a minimum 10-year period for areas with 26.0 inches or less) to demonstrate vegetative productivity. At the end of this period, if all regulatory and permit requirements have been fulfilled, the area becomes eligible for final bond release.

Since the bonding rate for mined land in Texas may exceed \$10,000 per acre (for example, where there has been replacement of oxidized overburden in the top four feet), there are considerable economic advantages to obtaining acceptance of land into the ERP as soon as possible.

In theory, acceptance of land disturbed by lignite mining activities into ERP should occur within a year or two after planting with permanent vegetation, once the vegetation has become well established. A condition of acceptance of land into the ERP is that the vegetation should meet the percent cover requirements specific for plant species and mine soil and climatic conditions. But in practice, there are often numerous other constraints which delay this process. The purpose of this paper is to show how these constraints interacted at the Gibbons Creek Lignite Mine in very subtle ways, requiring dynamic reclamation planning in response.

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The Gibbons Creek Lignite Mine, owned by the Texas Municipal Power Agency (TMPA), is located in Grimes County, east-central Texas, approximately 16 miles east of Bryan/College Station. Average precipitation is 40 inches per year, so the area is subject to a 5-year ERP. The mine was active from 1982 to 1996, and supplied TMPA's nearby Gibbons Creek Steam

Electric Station with lignite, from the Tertiary Manning Formation, at a rate of approximately 3.6 million tons per year. Overburden was removed by two Bucyrus-Erie 1570-class draglines. Approximately 450 acres of land were mined, and reclaimed, per year. Thus, by 1990, there were several thousand acres of reclaimed land that had established vegetation and that were, ostensibly, eligible for acceptance into ERP.

At the request of the permittee, ERP inspections were duly performed by RCT inspectors, first for Area 1 (333 acres) on November 6, 1990, and then for Area 2 (543 acres) on May 22, 1991. During the ensuing regulatory review, a number of issues were identified which needed resolution before ERP acceptance could be considered. In a number of cases, these were inter-linked in such a way that one issue had to be resolved before another could be tackled. Much later, in November/December 1994, ERP inspections were performed on a number of sites collectively, designated for this paper as Area 3 (863 acres) and Area 4 (847 acres). These areas also encountered a number of issues, some of which were new, which needed to be resolved before ERP acceptance could be obtained. These issues are discussed below.

### Summary of Issues

The ERP history described here applies to a permit area totaling 11,000 acres, of which about 4,200 acres were disturbed and mined from 1982 to 1992. A total of 2,586 acres has been inspected and accepted for ERP, in four parcels, over the period 1990-1996 (Figure 1); the remaining acreage is either under review or scheduled for inspection in 1997.

The main issues affecting the acceptance of these four parcels have been:

*Minesoil Texture.* This issue concerned the texture (sand, silt and clay content) of the post-mine soils. Early RCT guidelines had specified maximum technical criteria of 80% sand and 40% clay for minesoils. These limits were initially applied to the top four feet of post-mine soils, but were modified in 1992 (Hodgkiss, 1992) to address topsoil substitute materials only. In the case of topsoil substitute materials, provision was made for vegetation productivity to be used as a measure in the final soil suitability determination.

*Soil Baseline Permit Revision.* This issue concerned the approval of a native soil baseline to be used for the evaluation of the post-mine soil quality. The concept of the soil baseline is to provide site-specific standards,

based on the pre-mining native soils, to allow for those geochemical parameters which, even in the pre-mining condition, do not meet the RCT's technical criteria. For example, the Gibbons Creek Mine soil baseline identified native soils with sand contents of 90% and clay contents of 45%; consequently, these became the criteria for the permit instead of the RCT's technical criteria of 80% for sand and 40% for clay. Similar site-specific standards were derived for pH, acid-base account, and the trace elements, against which post-mine soil properties could be compared through the use of a "soil bank account". This procedure allows withdrawals to be made from the bank account up to the acreage set by the pre-mine native soils; acreages exceeding the bank account balance require remediation.

*Permit Consolidation.* This issue addressed the need for the consolidation of three contiguous permits which had accumulated by 1990 for the subject area. In addition to the considerable administrative benefits (such as fewer federal inspections), there were also a number of operational benefits, (such as, for topsoil hauling and selective overburden material placement, which had not been allowed across the former permit boundaries).

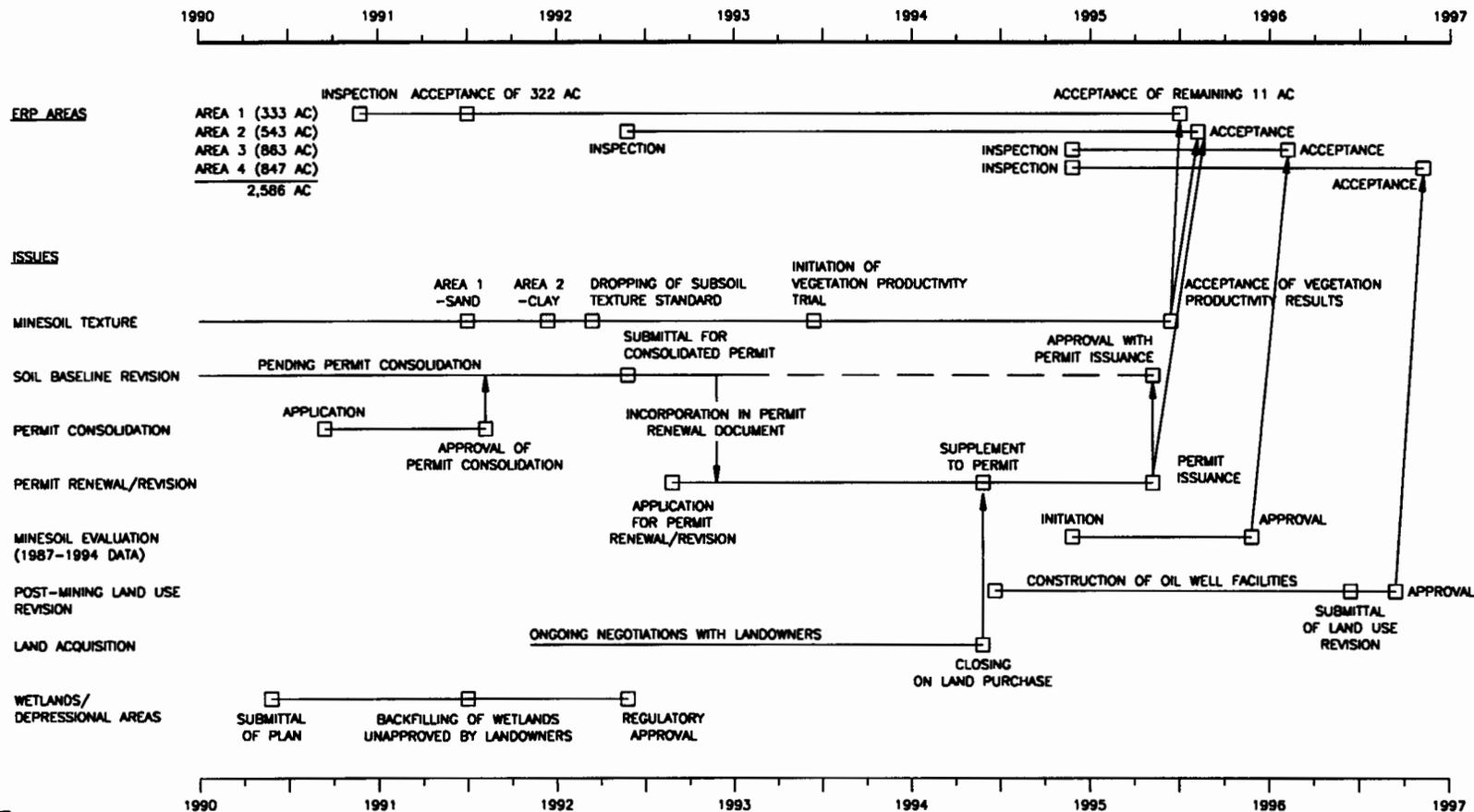
*Minesoil Evaluation 1987-1994 Data.* This issue concerned the determination by the RCT that the reclaimed post-mine areas did not contain acid-forming materials (AFM) or toxic-forming materials (TFM) in the top four feet. The evaluation consisted of a thorough and comprehensive review of all the minesoil data that had been submitted to date.

*Post-Mining Land Use Revision.* This issue concerned the revision of the approved post-mining land use to incorporate the oil/gas well pads and associated service roads which were constructed in a spate of activity over the period 1994-1996. It was not possible to submit accurate locations until all the construction activity had been completed.

*Land Acquisition.* This issue concerned the purchase of land from a family of landowners who were contesting proposed permanent structures, such as reclamation ponds (also restored drainages, drainage drop structures, wetlands/depressions, and roads). This issue was contested in an RCT public hearing, and continued to delay approval of a permit renewal/ revision application until eventually, a settlement between the permittee and the landowners was reached in 1994, thereby eliminating the issue.

*Depressions.* This issue concerned the definition of depressions, and the distinction between this feature and

FIGURE 1  
 TIME-LINE FOR ACCEPTANCE OF RECLAIMED  
 LAND INTO ERP AT  
 GIBBONS CREEK LIGNITE MINE



impoundments. There is no clear definition of a depression in the Texas Coal Mining Regulations, and a number of different criteria were tested over the period 1990-1996.

Current RCT criteria are that an aqueous structure, less than 0.5 acres in size and holding less than 3 feet depth of water is a depression if it exhibits the presence of hydrophytic vegetation (e.g., cattails or willows), demonstrating that it does retain water at some time of the year.

### Historical Interaction of Issues

The historical interaction of these issues and their impact on the ERP process at Gibbons Creek Mine is summarized graphically in Figure 1.

### Minesoil Texture

The minesoil texture issue probably had the most direct impact on ERP acceptance of Areas 1 and 2. In Area 1, after the November 6, 1990 ERP inspection, two 5.7-acre reclamation grids were denied acceptance on the basis of having more than 90% sand content to a depth of four feet. In Area 2, after the May 22, 1991 inspection, the whole 543-acre area was denied acceptance due to 33 5.7-acre grids having clay contents greater than 45% down to the same depth.

The texture issue relating to minesoil subsoils (i.e., the material in the zone between the base of topsoil or topsoil substitute and a depth of four feet) became a subject of general discussion between the RCT and industry in this period, and was finally settled when these standards were dropped on March 25, 1992 (Hodgkiss, 1992).

The texture issue relating to minesoil topsoil substitute materials (i.e., the material in the top foot of reclaimed minesoils) necessitated a field demonstration that vegetation productivity was not adversely affected by these textures. A vegetation productivity trial was initiated at the suggestion of the RCT in June 1993, and a final report was submitted in March 1995 (Westerman, 1996).

This report presented comparisons between topsoil substitute areas and native topsoil replacement areas for productivity over several prior years. The acceptance of the vegetation productivity study, in May 1995, paved the way for the acceptance of the two grids in Area 1 (May 1995), and the entire 543-acre Area 2

(August 1995). It should be noted that both areas were accepted into the ERP with dates effective as of the time of the initial vegetative cover inspection (i.e., November 6, 1990 for Area 1, and May 22, 1991 for Area 2).

### Soil Baseline Revision

The soil baseline revision for the permit area was initiated in 1989, but became linked with, and dependent on, the permit consolidation activity. Once this had been accomplished (June 1991), one new baseline was developed to replace the previous interim fragmented baselines. It was hoped that the baseline revision application could be handled administratively, but it was deemed a significant permit revision and was, therefore, incorporated in the application for renewal/revision of the newly-consolidated permit (submitted in August 1992), which was also a significant revision. Thus, the baseline now became linked with, and dependent on, the permit renewal process. The baseline eventually became effective, with the approval of the permit renewal/revision application, in December 1994. Until that time, it was not feasible to submit areas for ERP acceptance, since the minesoil properties could not be "banked" against the consolidated native soil baseline.

### Permit Consolidation

Consolidation of permits became an operational necessity in July 1990, when TMPA was informed that it would not be allowed to cross any permit boundaries (even boundaries formed between directly adjacent permit areas) with topsoil redistribution operations. Consolidation of these permits would eliminate the boundaries, and greatly benefit the project by reducing topsoil haul distances. A request for consolidation of the permits was submitted in August 1990 and approved in June 1991.

### Permit Renewal/Revision

The newly-consolidated permit had an expiration date of May 1993, corresponding to the earliest date of expiration of the individual permits before consolidation. An application for a renewal/revision of the new permit was submitted in August 1992. This document was to make a critical contribution to the ERP process - it contained numerous reclamation items which required *de facto* approval for ERP acceptance. These included structures such as: reclamation ponds, drainages, drop structures, roads, and depressions. It also addressed issues such as topsoil substitute areas, the native soil baseline, post-mining topography and slopes, and post-mining land use.

The revision was deemed to be a significant action. A public hearing was scheduled but was canceled following the successful completion of negotiations between TMPA and landowners in May 1994 (see discussion below on land acquisition). This prompted the preparation of Supplement No. 4 to the permit document, to be followed by two additional supplements (altogether a total of six supplements to the permit application were prepared over the period December 1993 through August 1994). The entire application was finally approved in December 1994, and a renewed permit was issued in April 1995 upon approval of the performance bond instrument.

Issuance of the permit immediately allowed the issue of permanent structures to be settled and, together with the approval of the vegetation productivity study in May 1995, paved the way for ERP acceptance on Area 2 in August 1995.

#### Minesoil Evaluation (1987-1994 Data)

Following the submittal (mid-October 1994) of the applications for ERP acceptance of Areas 3 and 4, the RCT initiated (late October 1994) an evaluation of all the minesoil data that had been submitted for the permit from 1987 to date. In the interim, Areas 3 and 4 were inspected for ERP acceptance (November/December 1994) and put on hold pending the minesoil evaluation. This was essentially completed by the end of November 1995. The evaluation resulted in a determination of no occurrence of acid-forming or toxic-forming materials in the top four feet of the reconstructed minesoils in both areas. Acceptance of Area 3 followed very shortly (February 1996, made retroactive to the time of inspection in 1994); however, Area 4 still had a further issue to resolve before it could be accepted into ERP - a post-mining land use revision.

#### Post-Mining Land Use Revision

Even as the permit renewal/revision was drawing to a close and the Hearings Examiner was preparing a Proposal for Decision, an oil/gas well drilling program started up inside the permit area. The construction of the well pads and associated service roads continued well past the issuance of the permit (April 1995) into early 1996. During this period, the drilling plans were so dynamic that it was impossible to predict where facilities would be located.

In the end, the facilities affected about half of the acreage that had been inspected for ERP acceptance in November/December 1994 (i.e., about 847 acres, or what

was to become Area 4). A permit revision to account for the new industrial/ commercial post-mining land use could not be attempted until the drilling had been completed in 1996. The permit revision request was eventually submitted in June 1996 and was approved as a non-significant revision in August 1996. The final issue had been resolved and Area 4 was subsequently accepted into the ERP in December 1996 (also retroactive to the time of inspection in 1994).

#### Land Acquisition

Negotiations with landowners became especially challenging in the course of the permit renewal/revision process, when approval was being sought to leave final pit end lakes and temporary impoundments as permanent.

Given the position of the regulatory authority that a landowner's approval had to be obtained for such structures, TMPA had no recourse but to reach a settlement and purchase the landowner's entire property within the permit area. Closure on this land acquisition was achieved in May 1994, breaking the stalemate on the permit renewal process, as discussed above (permit renewal/ revision), and opening the way for approval of the permit in December 1994.

#### Depressions

The history of post-mining depressions serves as a curious footnote to the history of the ERP process at Gibbons Creek Mine - for such small features of the landscape, they have caused a disproportionate impact on permitting and approval. The history begins in May 1990, with the submittal of a plan for the approval of 23 depressions on reclaimed lands in the permit area. Over the next year, discussions were held with the RCT on the definition of depressions, since they are not defined in the Regulations. In May 1991, Area 2 was inspected for ERP acceptance, and in July 1991, a couple of depressions in this area were backfilled and removed at the landowner's insistence; remaining depressions were approved in August 1991.

In January 1992, a total of 147 depressions on TMPA-owned reclaimed land in the permit area were inspected in detail and classified based on the presence of hydrophytic vegetation. These were approved in May 1992. Depressions not on TMPA-owned land were submitted for approval in the permit renewal/revision application in August 1992. These were eventually approved with the permit in December 1994.

## Conclusions

A *post-hoc* evaluation of the ERP process and its inter-linking with a number of permitting issues from the "real world" shows how complex the procedure can be, and offers insights on how to overcome these:

- The approved permit is a key document. A detailed, well-written permit, which addresses known issues (e.g., soil baseline, post-mining land use, depressions), and especially those involving landowners, is invaluable in facilitating ERP.
- Landowner issues are critical to the ERP process in the present regulatory environment. These should be resolved at the earliest possible time (e.g., location and size of reclaimed stock ponds and drainages). Preferably, reclaimed land should be owned, rather than leased, by the mine operation.
- Experience has shown the value of good data management, especially in the case of the very large databases associated with post-mining soil quality and vegetation productivity. Reliable records expedite the regulatory authority's review and approval process.
- Some issues cannot be predicted, such as the oil/gas well drilling program. These need to be accommodated as they develop on an *ad hoc* basis in flexible, long-range plans.
- Perseverance pays off. This means that there must be a long-range plan and strategy in place for known issues and all the components must be pursued in a systematic fashion (e.g., permitting all segments of a permanent post-mining road system).
- Acceptance of significant acreages of land into the ERP is possible, in spite of Murphy's Law, although the process may take much longer than originally anticipated. On a positive note, the date of acceptance into ERP has remained the initial vegetative inspection date.

## Literature Cited

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