

**Milestones Preceding the May 2008 Licensing of
Byproduct Material Disposal in Texas – 9307**

William P. Dornsife and Jeffrey M. Skov
Waste Control Specialists LLC, Dallas, Texas, USA

ABSTRACT

In June 2004, Waste Control Specialists LLC applied for a state license to construct and operate a byproduct material disposal facility at its site in western Andrews County, Texas. Detailed review by responsible state regulatory authorities, which included significant technical interchange with WCS, resulted in the issuance of a draft license in October 2007. Following public comment and consideration of hearing requests, the Executive Director of the Texas Commission on Environmental Quality (TCEQ) issued a final draft license in March 2008, which was approved by the TCEQ Commissioners and issued on May 29, 2008.

Construction of the byproduct material disposal facility began in September 2008 following completion of various pre-construction license conditions. Operation of the facility is expected to commence in June 2009, and will begin with the placement of 3,776 sealed steel containers of byproduct material waste received from Silos 1 and 2 of the U.S. Department of Energy's Fernald Closure Project site in Fernald, Ohio. General byproduct material disposal operations are expected to commence in the fourth quarter of 2009.

INTRODUCTION

On June 21, 2004, Waste Control Specialists LLC (WCS) submitted a license application to the Texas Department of State Health Services (DSHS) seeking authorization to safely dispose of byproduct material in a specially designated and designed, enhanced, near-surface landfill covering approximately 0.15 square kilometers (km²) (36.39 acres) at its 5.4 km² (1,338-acre) waste treatment, storage, and disposal (TSD) site in Andrews County, Texas. In 2007, the Texas legislature transferred the authority to review and act on the license application to the Texas Commission on Environmental Quality (TCEQ).

The DSHS/TCEQ staff performed a detailed review of the application and provided comments to WCS on a variety of matters. The comments were resolved by WCS through explanatory meetings, submittals of clarifying information, and changes in the application. On October 22, 2007, WCS received notification that the Executive Director of TCEQ had prepared a draft license and made a preliminary decision that this license met all statutory and regulatory requirements for the disposal of byproduct material at the WCS site. This notification was followed by a 30-day public-comment period.

On March 14, 2008, WCS received notification that the Executive Director of TCEQ had (1) filed a response to the public comments received on the draft license, (2) prepared a final draft license, and (3) made a decision that the final draft license met all statutory and regulatory requirements and recommended to the TCEQ Commissioners that the final license be issued.

On May 29, 2008, the TCEQ issued an order (1) denying requests for public hearing in accordance with applicable law, (2) adopting the Executive Director's Response to Public Comment, and (3) approving and issuing the license authorizing WCS to dispose of byproduct material at the Andrews County site. The order was based on a two-to-one vote by the TCEQ Commissioners during a regularly scheduled public meeting held on May 21, 2008.

The license authorizes WCS to dispose of up to 893,764 cubic meters (1,169,000 cubic yards) of byproduct material, upon fulfillment of various license conditions, including certain pre-construction license conditions. WCS completed the pre-construction license conditions and commenced the construction of the byproduct material landfill in September 2008.

On August 5, 2008, WCS awarded a three-year, \$80 million dollar contract to URS Corporation for construction of the byproduct disposal landfill and other improvements, including two low-level radioactive waste (LLW) landfills. (The draft LLW-disposal license was issued on August 11, 2008, and it is presented in another paper at this conference.)

The construction of the enhanced byproduct material landfill is expected to be complete in May 2009. Upon completion, the disposal of the Fernald, Ohio, Silos 1 and 2 byproduct material will begin. Other byproduct material is expected to be received from South Texas uranium miners and other generators of byproduct material.

BYPRODUCT MATERIAL

Byproduct material is the leftover residue from the processing of ore bearing uranium. The uranium is removed and converted into “yellowcake,” which is a form of uranium that can be converted into fuel for nuclear reactors. The residue left behind is called byproduct material. This residue usually consists of sand and sediments, but can also consist of piping, valves, tanks, and other equipment that is removed from processing plants when they are decommissioned. In accordance with Title 25 of the Texas Administrative Code (T.A.C.), Section 289.260(c)(4), “byproduct material” is: “Tailings or wastes produced by or resulting from the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by such solution extraction operations do not constitute ‘byproduct material’ within this definition.” The state’s definition of “byproduct material” corresponds to the definition found at Section 11.e.(2) of the Atomic Energy Act of 1954, as amended, and therefore excludes the three other categories of “byproduct material” recognized in the federal statute; i.e., 11.e.(1), 11.e.(3), and 11.e.(4) byproduct material.

THE SITE

The byproduct material disposal facility will be located on property owned by WCS that encompasses approximately 60.3 km² (14,900 acres) in western Andrews County, Texas. The proposed landfill will be located on a 5.4-km² (1,338-acre) tract of land upon which WCS currently operates a facility to receive low-level and mixed low-level radioactive waste for storage and processing. That facility is licensed by the Texas Commission on Environmental Quality (TCEQ License Number R04971). WCS is also authorized by the TCEQ and U.S. Environmental Protection Agency (EPA) for the receipt, storage and treatment of hazardous waste, non-hazardous industrial solid waste, and waste containing polychlorinated biphenyls (PCBs). In addition, WCS operates a RCRA/TSCA landfill on the 5.4-km² tract, which is authorized by the TCEQ and EPA for disposal of hazardous waste, industrial non-hazardous waste and waste containing PCBs.

The proposed byproduct material disposal facility will be located just to the north of the existing RCRA/TSCA landfill; will occupy approximately 0.15 km² (36 acres) of land; and will provide a disposal capacity of nearly 900,000 cubic meters. The nearest property line is over 0.8 km (a half mile) from the byproduct material disposal facility. The nearest residence is approximately 5.6 km (3.5 miles) from the

disposal facility. The closest active commercial/industrial operations are over 0.8 km (a half mile) from the disposal facility.

Western Andrews County is ideally suited for this disposal facility because:

- Large areas of the state would be less suitable because of higher annual rainfall, higher population densities, proximity to significant aquifers, proximity to international borders, etc.
- It is preferable to select a site that already has a compatible use. The WCS site is currently licensed to store and process radioactive material, including byproduct material. These activities are compatible with byproduct material disposal. Few other potential sites in Texas would have similarly compatible current uses.
- The local community is very supportive of this proposed licensing activity and welcomes the additional business

LANDFILL DESIGN AND OPERATION

The proposed byproduct disposal facility will comprise an approximately 0.065-km² (16-acre) landfill with an engineered liner, associated support structures on the surface, and a buffer zone. A small portion of the buffer on the west side of the facility is located outside of the approximately 5.4-km² (1,338-acre) tract of land, but is located entirely on land owned and controlled by WCS. Disposal in the proposed landfill will occur completely below the top of the Triassic Dockum red beds, which is a laterally extensive (tens to hundreds of kilometers) and very thick (>300 meters) massive clay and sandstone/siltstone formation.

Caprock caliche, sands, and gravels of the Ogallala, Antlers and Gatuña formations (the OAG) extend from the surface to the top of the red beds. The OAG ranges in thickness in the immediate area of the byproduct landfill from about 5.5 meters (18 feet) to approximately 9.8 meters (32 feet).

The landfill containment system will consist of the in-situ red bed clays and siltstone/sandstone materials, approximately one meter (three feet) of re-compacted select red bed clay, a 1.52-millimeter (mm) (60-mil) high-density polyethylene (HDPE) geomembrane, a geonet leak detection system, another 1.52-mm (60-mil) HDPE geomembrane, a geocomposite consisting of a geonet with a geotextile bonded to it, and approximately 0.6 meters (two feet) of protective granular soil. The hydraulic conductivity of the in-situ clay has been demonstrated to range from approximately 10⁻⁸ centimeters per second (cm/sec) to 10⁻⁹ cm/sec, which is approximately the same as concrete. The hydraulic conductivity of the sandstone/siltstone zones range from approximately 10⁻⁷ cm/sec to 10⁻⁸ cm/sec. The hydraulic conductivity of the re-compacted select red bed clay has been demonstrated to consistently range from approximately 10⁻⁸ to 10⁻⁹ cm/sec. The minimum cover thickness above the waste is 5.49 meters (18 feet). The minimum cover thickness above the waste exceeds the minimum requirement for an effective radon barrier. The cover minimizes surface water infiltration because of the very low hydraulic conductivity of a thick layer of compacted red bed clay. A mounded capillary break (sand drainage layer) is below the upper thick clay layer. The capillary break, which is placed over a geomembrane and another compacted clay layer, is tied into the naturally-occurring OAG sand layer on top of the red bed formation. The sand formation will act to drain moisture away from the landfill area. Impacts resulting from high winds and other natural meteorological hazards are minimized because the disposal operations will be conducted well below the surface of the ground. Design features will prevent surface water run-on from entering the landfill, and the low annual average precipitation combined with the operational methods will minimize the generation of contaminated storm water. Storm water that falls within the open landfill cells where there is exposed waste will be used for dust control within the landfill and to assist in compaction of the waste materials. The depth of the waste disposal and the low topographic

relief of the surface in the area of the landfill combine with the naturally-occurring armor of the caprock, which has been forming for tens of thousands of years and continues to form in the arid West Texas environment, to mitigate erosion at the landfill. An environmental monitoring program includes routine sampling and analyses of groundwater, air, soil, and flora/fauna, and measurements of direct radiation.

GEOLOGY

The proposed landfill will be located on what is known as the red bed ridge, a broad gently sloping local topographic high, generally oriented northwest-southeast, which drains to the southwest toward Monument Draw in New Mexico. Surface caliche, known on the Southern High Plains as the Caprock caliche, is thinnest on the red bed ridge, with the top of the red beds becoming more deeply buried to the north and to the south of the WCS facilities area.

The location of the proposed landfill will make maximum use of the natural characteristics of the site. Disposal will occur completely within the massive red bed clays. The landfill will be excavated through the caliche and into the underlying red bed. The placement of waste will occur only within the massive red bed formation from about 5.5 meters (18 feet) (minimum) below ground level to approximately 30.5 meters (100 feet) below ground level.

The first sandstone capable of providing usable amounts of water (which is essentially non-potable) is the Trujillo Formation, the top of which is approximately 183 meters (600 feet) below ground level and is approximately 30.5 meters (100 feet) thick. Below the Trujillo sandstone, the red beds extend to a depth of approximately 347 meters (1140 feet) below ground level to the top of the Santa Rosa sandstone. At the WCS site, the Santa Rosa sandstone extends to approximately 427 meters (1400 feet) below ground level. This is the base of the Triassic Dockum formation.

The Triassic Dockum red bed formation is composed primarily of hard, virtually impermeable clay interspersed in the upper portion with thin siltstone and sandstone stringers and layers, which are also hard and almost impermeable. The first water bearing (saturated) zone is approximately 27 meters (90 feet) below the bottom of the landfill; however, due to the impermeability of this zone, water cannot be produced for domestic or industrial uses. Contaminant transport to the first saturated zone was modeled using various scenarios and models.

SAFETY

The performance assessment for the facility indicates that construction and operation of the byproduct material disposal facility at the WCS site will not pose a threat to human health or the environment. Using the industry standard modeling, no contaminants reached the saturated zone in one million years. Assuming continuous flow moved through a fracture all the way to the saturated zone, the modeled transport time was in excess of 70,000 years.

WCS will be responsible for the safe and compliant construction, operation, and closure of the proposed facility. WCS has a proven track record of safe operations at its existing facilities, and has shown to be financially capable of constructing and operating the proposed byproduct disposal facility in accordance with applicable laws and regulations. Upon closure of the facility, WCS will deed the land and disposed byproduct material to the state or federal government. WCS will be posting in excess of four and a half million dollars to guarantee closure of the facility and to fund long-term monitoring and maintenance of the facility.

BYPRODUCT LICENSING SUMMARY

On June 21, 2004, WCS submitted an application for a license to dispose of byproduct material to the Texas Department of State Health Services (DSHS). A comprehensive technical interchange with DSHS followed, which is documented in five DSHS “Notice of Violation” (NOD) letters, other DSHS letters requesting clarifications or additional information, and multiple WCS response letters. The final revision to the application, Revision 17, was submitted to DSHS on June 4, 2007.

Authority for byproduct material disposal licensing transferred from the DSHS to the TCEQ on June 15, 2007, in accordance with Texas Senate Bill (S.B.) No. 1604, enacted by the 80th regular session of the Texas Legislature.

TCEQ completed the technical review of the application and issued a draft license and draft environmental analysis on October 27, 2007. After a 30-day public comment period, TCEQ evaluated the comments that had been received, which included WCS comments, and on March 14, 2008, issued a Response to Public Comment document, a two-page errata for the draft environmental analysis, and a final draft license.

The TCEQ Commissioners considered the matter at their regularly scheduled public meeting on May 21, 2008, and voted two-to-one to approve and issue the license. The associated TCEQ order was issued and effective on May 29, 2008.

The approved license is 31 pages long and comprises 96 license conditions (LCs). It authorizes WCS, after meeting various pre-construction and pre-operational LCs, to construct the disposal facility and dispose of up to 893,764 cubic meters (1,169,000 cubic yards) and 24,530 curies of byproduct material (LC 7.A).

The license adopts the state’s definition of byproduct material, which, as discussed above, is narrower in scope than the federal definition. The license also prohibits the receipt and disposal of uncontainerized, bulk byproduct material (LC 14), and the receipt of byproduct material by rail (LC 14.B).

Excavation of the disposal facility began in September 2008. WCS currently plans on commencing disposal of the Fernald canisters—3,776 sealed steel canisters of byproduct material waste from Silos 1 and 2 of the U.S. Department of Energy’s Fernald Closure Project site in Fernald, Ohio—in June 2009. General byproduct material disposal operations are expected to commence in the fourth quarter of 2009.