

# **The Remediation of Abandoned Iron Ore Mine Subsidence in Rockaway Township, New Jersey**

---

<b><u>Project Title</u></b>	The Remediation of Abandoned Iron Ore Mine Subsidence in Rockaway Township, New Jersey
<b><u>Report Type</u></b>	Semi Annual Technical Progress Report
<b><u>Reporting Period</u></b>	Start Date – April 1, 2003 End Date – September 30, 2003
<b><u>Principal Author</u></b>	Gary Gartenberg, P.E., P.P.
<b><u>Report Issued</u></b>	December 2003
<b><u>DOE Award #</u></b>	DE-FC26-97FT975000
<b><u>Submitted By</u></b>	Mr. Steven Levinson, M.S., HO Business Administrator Rockaway Township Sixty-Five Mt. Hope Road Rockaway, New Jersey 07866-1699
Report Production By: Gary Gartenberg, P.E., P.P. Gartenberg, Associates, L.L.C. P.O. Box 243 Convent Station, New Jersey 07961	

---

**Disclaimer**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

---

**Abstract**

This report represents the thirteenth Technical Progress Report issued in connection with the subsidence remediation projects undertaken by Rockaway Township in Morris County, New Jersey. This report provides a summary of the major project work accomplished during this semi annual reporting period and contemplated for the subsequent reporting period. This report is issued as part of the project reporting provisions set forth in the Cooperators Agreement between the United States Government - Department of Energy, and Rockaway Township.

The purpose of the Cooperators Agreement is for the Department of Energy to provide technical and financial assistance in a coordinated effort with Rockaway Township to develop and implement a multi-phased plan to remediate ground stability problems associated with abandoned mining activity. Primarily during the 1800's, extensive iron ore mining and prospecting was undertaken in Rockaway Township, part of the Dover District Mining region in Morris County. The abandoned mining activity has resulted in public safety hazards associated with ground collapse and surface subsidence features evolving in both developed and undeveloped areas within Rockaway Township.

At the Green Pond Mine site at the Township's Jacobs Road Compost Storage Facility, construction was completed during this reporting period and surface monitoring began. Surface monitoring was conducted periodically at the Mt. Hope Road subsidence work area and adjacent areas after the January 2000 construction effort.

---

**Summary**

The remedial construction for surface closure of the main shaft of the Green Pond Mines S.E. began and was completed in September 2003. The actual construction and final results were consistent with that predicted by previous geotechnical investigation and engineering design.

At the White Meadow Mine, no work was conducted this reporting period.

Monitoring of the Mt. Hope Road subsidence project occurred during this reporting period. No observations of adverse subsidence were noted at the area of concern.

---

**Table of Contents**

Title Page	1
Disclaimer	2
Abstract	3
Summary	4
Table of Contents	5
Results and Discussion	6
Conclusions	8
Appendix	9

### **Results and Discussion**

The following information provides the results of the major issues, work and investigations considered during the reporting period of this Technical Progress Report.

#### **General Project Communications and Fundamentals**

During this semi annual reporting period various communications and coordination occurred in connection with the project work and Cooperators Agreement. Work occurred toward preparation of the Technical Progress Report for the previous period for the United States Department of Energy in accordance with the Cooperators Agreement.

#### **Green Pond Mines – Project**

In September 2003 construction began and was completed for the remediation of the subsurface subsidence associated with abandoned mining activity at the Green Pond Mines S.E. site. The work in general terms included excavation of the bottom of the existing shaft, placement of jetty stone and concrete, backfilling to the surface with the installation of steel surface markers.

The main shaft in question had been utilized in the past for disposal of trash such as large metal appliances, other metal objects and large tree pieces. Portions of the shaft primarily along the foot wall were filled with poorly consolidated debris.

Initially large cut tree limbs and trunks with some metal debris were removed from the existing shaft floor down to approximately 25 feet below grade. Large jetty stones and stone boulders were placed and compacted onto the existing shaft floor.

Forty yards of concrete was placed to form a matrix with the stone boulders to form the cap at the bottom of the existing shaft approximately twenty feet below the shaft collar. Three deformed reinforcing bars were placed near the edges of the cap in the matrix and routed vertically to the surface through pipes for monitoring of the concrete safety plug. During the concrete placement approximately six yards of concrete flowed down below the floor of the shaft into the lower portions of the mine or acted to fill the lower portion of the stone installation. Regardless, observations indicated that a sufficient depth of matrix had been created with the concrete and boulders to form the safety cap.

Clean stone and filter fabric were placed over the top of the concrete safety cap surface and the shaft was back filled approximately 15 feet to the surface. The work area was regraded to conform to the natural grade of the site to promote storm water sheet water flow away from the shaft area.

Preliminary engineering survey established the initial elevations on the three surface markers with the elevations tied to adjacent bench marks for future monitoring of the subsurface construction.

**Mt. Hope Road – Project Status**

Monitoring of surface conditions at the area of work has not indicated any adverse surface conditions or subsequent subsidence since the January 2000 construction was completed.

**White Meadow Mine – Project Status**

The remedial construction work was completed by others during 2002. The hard construction costs for this project are outside of this Cooperators Agreement.

**Green Pond Mines – Project Status**

With the completion of the remedial construction during September 2003, the concrete/boulder safety plug will be monitored from the surface for future subsidence.

**General Remediation – Project Status**

Numerous hazards exist within Rockaway Township from abandoned mining activity. The Township will address other abandoned mining activity hazards on a priority basis under the Cooperators Agreement with completion of the Green Pond Mine project construction.

**Subsequent Reporting Period Activity Plan**

Periodic engineering survey will be conducted to monitor the sub surface cap of the main shaft of the Green Pond Mines S.E. The surface markers allow for the detection of any subsidence or change in attitude of the slab.

The balance of the financial assistance from the United States Department of Energy under this agreement will be applied toward addressing other mining hazards in Rockaway Township on a priority basis.

**Conclusions**

The structural geology and petrographic conditions specific to the Dover Mining District in New Jersey allow for the effective use of boulder and concrete matrix construction for shaft safety caps. At the Green Pond Mine shaft, this construction was a cost efficient method of addressing surface shaft subsidence. Success in the execution of the construction work is achieved with the use of large jetty stone and proper concrete mix.

---

**Appendix**

This Report does NOT contain an Appendix

---