

TECHNICAL PROGRESS REPORT

Quarterly Report

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ABSTRACT

Two industrial prototype units for through-the-earth wireless communication were constructed and tested. Preparation for a temporary installation in NIOSH's Lake Lynn mine for the through-the-earth and the in-mine system were completed.

Progress was made in the programming of the in-mine system to provide data communication. Work has begun to implement a wireless interface between equipment controllers and our in-mine system.

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RESEARCH, DEVELOPMENT, AND EXPERIMENTAL

We have constructed and tested the electronic circuits for *two* industrial prototype modules for wireless through-the-earth communication. Several modifications were made to peak system operation.

The modulation, demodulation and filtering of the signal is done through software. We wrote the necessary programs and tested them in the system. Individual functions of the software functioned properly, but in combination the package ran out of processing time. This required modification of the program to function more efficiently without losing accuracy and voice quality.

Progress was made in adding a data channel to the in-mine system. The first step was to establish data communication between two computer terminals connected to different control modules of our system. The second step is to build a wireless RF digital interface so that data can be transmitted from remote sensors and controllers through our system to the control room. For this purpose we have begun to implement a wireless digital interface between PLCs (Programmable Logic Controllers) and our system.

In preparation for the installation of our demonstration systems in NIOSH's Lake Lynn mine, we constructed mounting structures for a temporary installation. Demonstrations are scheduled for the first week in April 2002 and again for the last week in April.

RESULTS AND DISCUSSION

We have constructed *two* through-the-earth industrial prototype modules for demonstrations in mines. These two prototypes constitute a complete system by which two-way wireless voice communication is established between the interior of a mine and the surface. Demonstrations of the system will be conducted to wide audiences at NIOSH's Lake Lynn mine April 5th through April 12th, 2002, and again April 20th through May 4th, 2002.

To monitor data from remote sensors and control equipment wirelessly, data channels must be added to Transtek's communication systems. This work has begun and data can now be transmitted between remote computer terminals connected to separate control modules of the in-mine communication system. The data channel operates successfully without interfering with the voice channels.

CONCLUSIONS

The program for the second year of this project calls for adding two-way data communication channels to Transtek's wireless communication systems. This phase has begun successfully by adding a data channel to Transtek's in-mine communication system.