

Request for Special Temporary Authority

By the instant application (“STA Request”), Phelps Dodge Morenci, Inc. (“Phelps Dodge”) requests that the Commission grant special temporary authority (“STA”) to permit Phelps Dodge to operate the facilities (the “Facilities”) specified in the instant STA Request. STA is requested for a period of six (6) months from the date of grant of this STA Request.

1. **Purpose of the Operation**

The instant STA Request seeks authority to test on a trial basis a product known as the Collision Avoidance System (“CAS”) designed and manufactured by Advanced Mining Technologies (“AMT”) in conjunction with CSIRO Exploration and Mining. The CAS is a tool for protecting against collisions involving the massive vehicles utilized in open pit mining operations. Although these units are currently certified and operated in Australia, Phelps Dodge requests authority from the Commission to test the functionality and reliability of this technology in the context of its open pit mines in the United States, and to compare the CAS against existing technology.

Existing technology addresses blind spot collisions through the use of “soft” barriers, such as no-go zones, standard parking and start-up procedures, and audible reversing alarms. The CAS technology is intended to provide enhanced driver vision supplemented by an automatic detection system that “looks” in all high-risk directions at once, identifies problems within a programmed detection range (typically between 0-80 meters) and attracts the driver’s attention to those areas where potential collisions could occur. In addition, the technology offers the ability to warn not only the vehicle drivers, but also to visually and audibly warn any personnel at risk through the use of alarms. The technology purports to provide improved vision for drivers through the use of video cameras, rugged construction for reliability in mining environments and reliable operation in adverse environmental conditions (e.g., dust, fog, smoke, heat and darkness). The CAS technology utilizes color video cameras with LCD video display units as vision aids, and RF transmitters and receivers for automatic object detection and classification. The frequency band on which the RF equipment operates is the band specified on the instant application.

The site at which this technology is sought to be tested is Phelps Dodge’s Morenci Mine, located in Morenci, Arizona. The Morenci Mine is the largest copper mine in North America, covering an area of approximately 5 x 5 miles in active mining operations. This location is extremely remote and characterized by hostile and mountainous terrain where safety concerns are particularly acute. Operation at the Morenci Mine continues 24 hours per day/7 days per week, so night safety is key factor as well. The large haul trucks utilized in this operation can be as large as 20 feet high, 42 feet long and 846,000 pounds in gross vehicle weight, and must be maneuvered around much smaller objects, and people, often on relatively narrow surfaces, including the

bottom of the mine pit which is 4,900 feet (1,650 meters) below ground level (a picture of a large haul truck is attached).

2. Why STA is in the Public Interest

The CAS technology may enhance the safety of U.S. miners working in proximity with large haul trucks in open pit mine environments. As discussed above, current methods of preventing blind spot collisions have limitations that the CAS technology may significantly improve, including in areas relating to operation in adverse environmental conditions, broader detection zones, improved alarm systems. The use of this technology could enhance safety and productivity of open pit mines by permitting more efficient mining operations.

Accordingly, because of the potential safety enhancements that this technology may bring to U.S. mine workers, Phelps Dodge respectfully submits that grant of the instant STA Request is in the public interest.

3. Other Issues

A. Prevention of Interference

Phelps Dodge hereby advises the Commission that the tests to be conducted under the requested Commission authorization are to be conducted at the bottom of an open pit mine, approximately 4,900 feet (1,650 meters) below ground level at present, in an extremely remote location in the desert in Morenci, Arizona, well removed from virtually all non-Phelps Dodge related commercial activity. The CAS devices will not have line of sight transmissions outside of mine pit, and will be utilized at a low power levels (Note: Output Power is listed on the application as 6.5 mW, and ERP is listed as 20 mW – the device will be utilized with no greater than a 4 dB antenna). Phelps Dodge supervisor James Hanson will be available by wireless telephone at (928) 322-2217. Mr. Hanson will act as a “stop buzzer” if any issues regarding interference arise during testing.

B. Message Structure, Modulation and Waveform

Attached hereto are some materials provided with the consent of AMT to assist with the Commission’s understanding of the message structure, modulation and waveform associated with the CAS RF transmissions. The repetition period can vary from 60 – 170 ms depending on whether other RF units are transmitting at the time. All RF units randomly transmit data packets after checking that no other transmissions are present. If other units are transmitting, the unit attempting to transmit a data packet will automatically go into a period of short random delay before attempting to re-transmit a data packet. If on the second try, other units are still transmitting, the unit attempting to transmit a data packet will automatically go into a period of longer random delay before attempting to re-transmit a data packet. Depending on the number of RF units present at the time, the repetition period can vary from 60 - 170ms. The output power levels are constant.

For all of the foregoing reasons, review and approval of this STA Request is in the public interest, convenience and necessity.



1 RF Message

1.1 Structure

The CAS RF messages consist of six data bytes each –

IDmsb	Object ID (3 hex bytes)
IDmid	
IDlsb	
STATUS	Object status (1 hex byte)
CRCmsb	Message CRC checksum (2 bytes)
CRClsb	

This data is converted into Manchester code whereby each data byte is expanded into two Manchester bytes. ie each data nibble is represented by one Manchester byte.

IDmsb1	Object ID (6 Manchester bytes)
IDmsb2	
IDmid1	
IDmid2	
IDlsb1	
IDlsb2	
STATUS1	Object status (2 Manchester bytes)
STATUS2	
CRCmsb1	Message CRC checksum (4 Manchester bytes)
CRCmsb2	
CRClsb1	
CRClsb2	

The data is then transmitted, with added preamble, header, footer and postamble bytes, as a 21 byte packet. The header and footer are not Manchester encoded.

Preamble:	55h 55h 55h
Header:	C3h 3Ch C3h 33h
Data:	IDmsb1 IDmsb2 IDmid1 IDmid2 IDlsb1 IDlsb2 STATUS1 STATUS2 CRCmsb1 CRCmsb2 CRClsb1 CRClsb2
Footer:	33h
Postamble:	55h

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1.2 Manchester Code

Each data byte is separated into two nibbles and then each nibble converted into Manchester code as per table 1.2.1.

Data Nibble	Manchester Byte	Data Nibble	Manchester Byte
0h	55h	8h	95h
1h	56h	9h	96h
2h	59h	Ah	99h
3h	5ah	Bh	9Ah
4h	65h	Ch	A5h
5h	66h	Dh	A6h
6h	69h	Eh	A9h
7h	6Ah	Fh	AAh

Table 1.2.1 Manchester Codes

Eg Data packet: ... 12h 45h 9Ah ...
 Transmitted Packet: ... 56h 59h 65h 66h 96h 99h ...

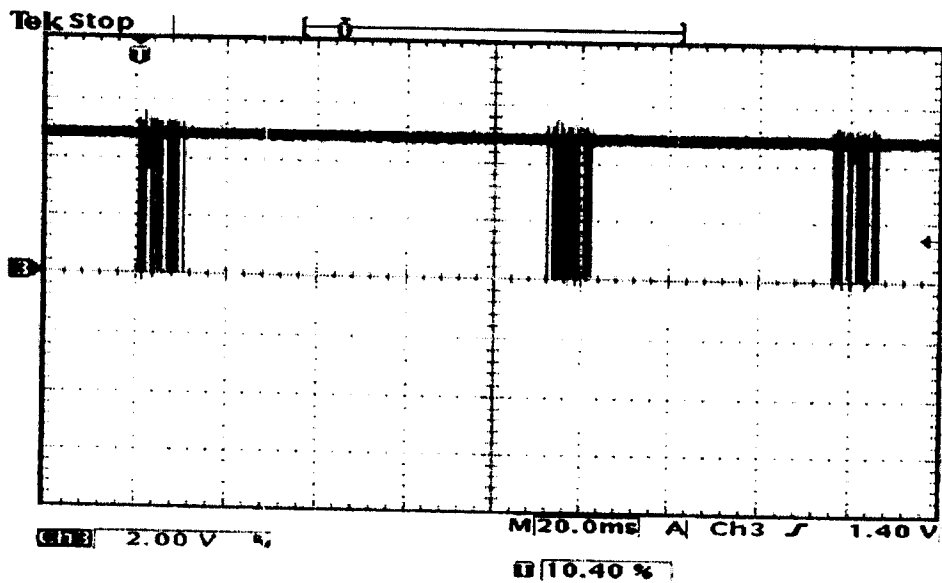
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1.3 Protocol

Data is transmitted with the following protocol -

Protocol:	1 start, 8 data, (no parity), 1 stop	(10 bits)
Message length:	21 Manchester bytes	(210 bits)
Baud rate:	19.2 kbd	(52.08 μ s/bit, 520.8 μ s/byte)
Message time:	10.94ms	(21 x 520.8 μ s)
Repetition period:	60 – 170 ms	
Modulation type:	ASK with On-Off-Keying (OOK)	
ASK depth:	30db	

Packets are illustrated in figures 1.3.1 to 1.3.3.



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Fig 1.3.1 CAS RF Modulation Signal – Packet Repetition

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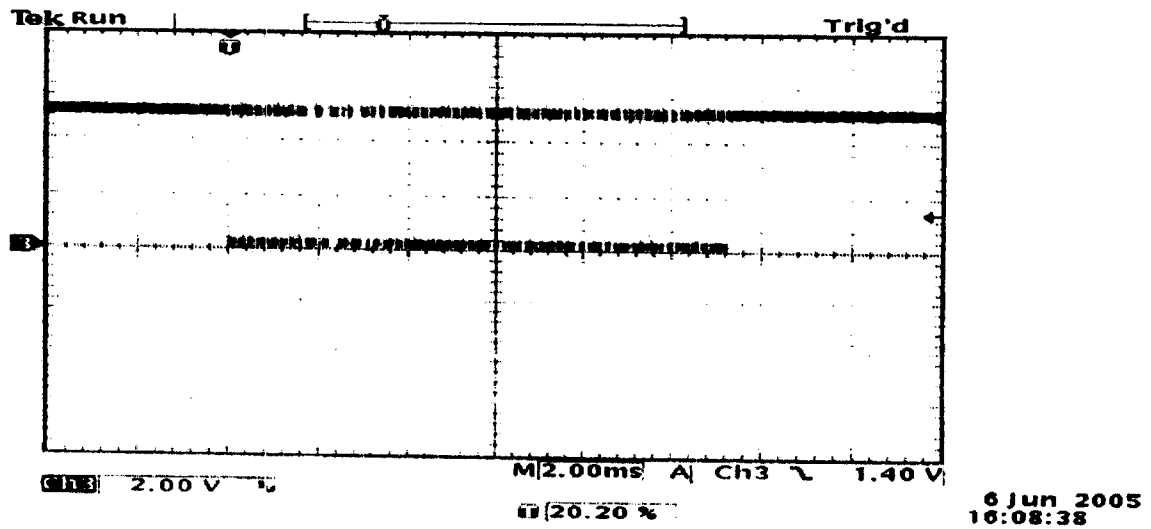


Fig 1.3.2 CAS RF Modulation Signal – One Message Packet

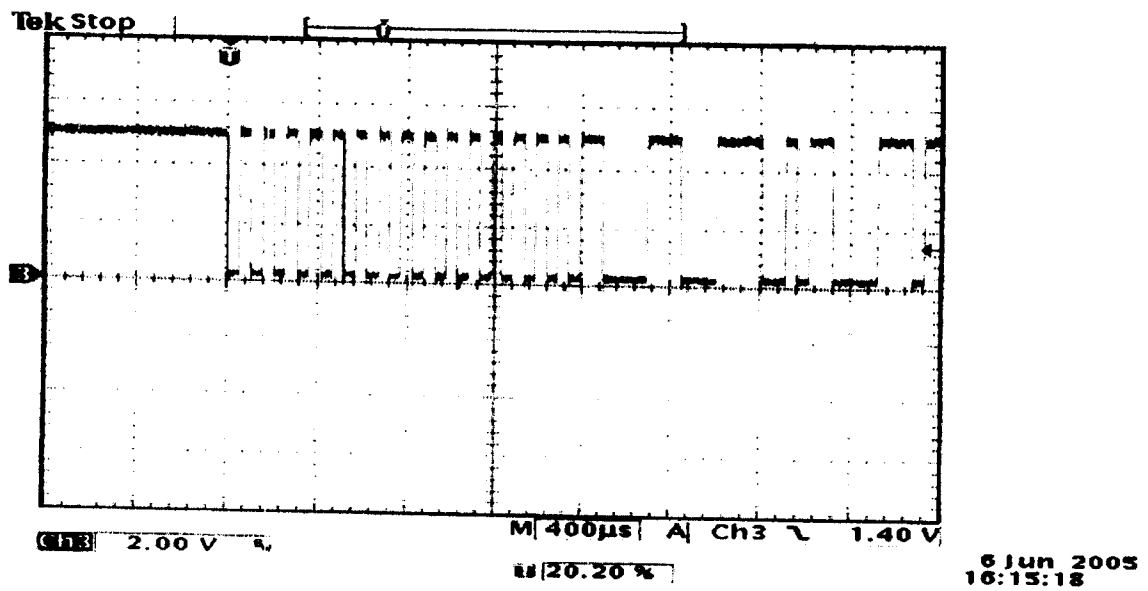


Fig 1.3.3 CAS RF Modulation Signal – Expanded Partial Packet

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