BRANDON EMERGENCY ALERTING PROJECT

PROCEDURAL GUIDE FOR THE IMPLEMENTATION OF A SIREN SYSTEM AS A PUBLIC ALERTING TOOL

January 2004

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City of Brandon

FORWORD

The City of Brandon, the Brandon Emergency Support Team, the Community Advisory Committee for Emergency Preparedness, Acoustic Technology Inc., Probe Research, Manitoba Hydro, Brandon Regional Health Centre, Brandon School Division, Riding Mountain Broadcasting, Craig Broadcasting, Standard Radio, The Brandon Sun, The Wheat City Journal are pleased to have taken part in The Brandon Emergency Alerting Project which demonstrated and evaluated new alerting technologies and products in cooperation with Industry Canada.

Our long term vision for public alerting sees a community that has the technological resources to notify each and every one of its citizens through a variety of means. We recognize that the majority of emergency events occur at the local level and impact upon localized populations. With this in mind, we envision our citizens as being educated to the point where they understand what an alerting message is telling them and they are motivated to take the actions necessary to help themselves and their neighbours. We see the citizens of Brandon as partners in our emergency preparedness program and as such each having a vital role to play to protect everyone's safety.

The hazard assessment for the City of Brandon identifies transportation and industrial accidents as likely occurrences. Any release of a chemical product by such an occurrence has a high level of maximum threat to the community. Brandon is also identified as being vulnerable to severe weather such as tornadoes. Portions of the City are built below the flood level of the Assiniboine River and are protected by dikes. Failure of a dike would require instant notification of the people located in the flood zone. The City also has occasional fires, in both residential and commercial buildings and smoke carrying toxic chemicals may necessitate a notification.

We believe that an alerting technology is part of a complete system of emergency preparedness and that it coupled with proper and realistic public education will have a dramatic effect on the lives of everyone living in our City. This includes people with special needs. An alerting system must be part of a complete program so that people are not surprised by the alert. In fact they should be expecting to be alerted every time the need arises and they should be expecting to be alerted in a variety of ways.

TABLE OF CONTENTS

1. THE BRANDON EMERGENCY ALERTING PROJECT

In 2003, the City of Brandon, Manitoba along with many community partners tested a wireless siren system designed for use in community emergency alerting. The project called the Brandon Emergency Alerting Project (BEAP) was supported by Industry Canada, the Brandon Emergency Support Team (B.E.S.T.), the Community Advisory Committee for Emergency Preparedness, and several business partners. The following project goal was set:

Project Goal

To determine if a siren alerting system is effective and acceptable to the citizens of Brandon.

Feedback was obtained through various community meetings and forums to help determine the style of siren sound that the community might find acceptable. It was realized very early on that this was a project for the people of Brandon and as such B.E.S.T. would ensure that the citizens had input. This became a major focus of the project in that Probe Research was hired to survey the public to determine what the people really thought of the idea and the technology. Like the results or not B.E.S.T. would use this information to make a final decision on the merits of a siren system for community alerting. Although the members of B.E.S.T. believe that an alerting system is needed they also understand that it has to be a system that the public will embrace.

One of the founding B.E.S.T. members conducted research into siren manufacturers and settled on ATI from Boston, Massachusetts. They made a presentation to B.E.S.T. and it was agreed to use this company.

The equipment decided on was a wireless system as follows:

- One Central Control Station - REACT 4000 Central Control Unit Model 4000CCU. With microphone for live PA, radio, antenna, antenna surge suppressor (one way system).
- One High-Power Speaker Station - Model HPSS16. With integrated RC for UHF/VHF radio communications with Central Station, antenna and antenna surge suppressor. Custom configured speaker head. Capable of producing various tone signals and live voice broadcasts. Standard power feed of 120V and battery back-up operation in the event of power loss. NEMA - 4 enclosure of painted metal.
- One strobe light. Mounted at the top of the siren.
- One wireless interface to key facilities.
- One Tone Alert Receiver

BEAP had the commitment of numerous people and organizations to make this project work. A BEAP team was established coordinated by the City's Emergency Coordinator. Technical assistance was provided by ATI personnel. Research assistance was provided by Probe Research Inc. Clarification of community issues came from the Community Advisory Committee for Emergency Preparedness. Clarification of business, health care, and school issues was provided by the members of the Brandon Emergency Support Team. Additional assistance came from City staff and Departments helping with

equipment. The Brandon Regional Health Authority permitted BEAP to use their VHF radio system for the tests. Manitoba Emergency Measures Organization provided advisory support. Manitoba Hydro provided the electrical supply. Imperial Radio assisted with the two-way radios. The Brandon Amateur Radio Club installed the antenna.

The speaker station was installed in the 900 block of Douglas Street. Manitoba Hydro determined that a 65 foot wooden pole would be required and it was installed. The antenna and cable was installed on the roof of Assiniboine Community College. The cable connects to the Central Control Unit which is located in a room in ACC. On June 6, 2003 the installation of the speaker station, central control unit, and radio links was completed.

There was also a public education campaign for the Brandon Emergency Alerting Project (BEAP) that went very well. Local media from Standard Radio, Craig Broadcasting, and Riding Mountain Broadcasting formed a Media Team. The campaign included radio, television, newspapers, direct mailings, street signs, internet, public postings, and community meetings. When people were interviewed in telephone surveys it was found that more than 90% were aware of BEAP.

2. WIRELESS SIREN TECHNOLOGY AND ITS EFFECTIVENESS

Filling the gap in Pubic Alerting

The siren system enhances existing alerting in the community. The siren is able to alert approximately 40% of the population in a given area of an emergency situation. The desired effect of the siren is to get people to go to local media for up-to-date information about what action they should or should not be taking.

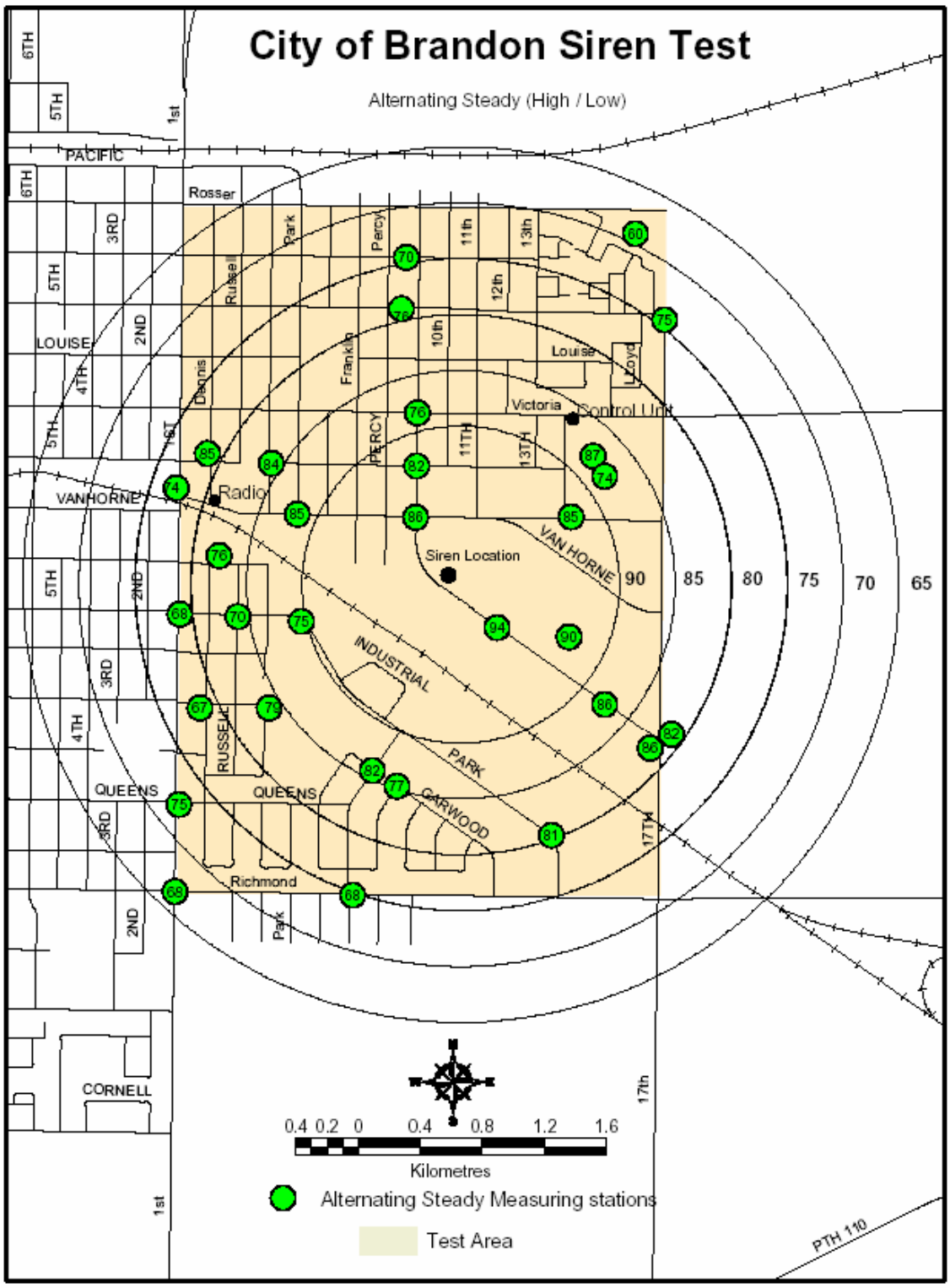
The siren can quickly notify the population that something is going on. The present alerting system involves emergency services personnel going door to door and the media broadcasting information. The two systems work well together and enhance what each other can do. In a multi-hazard world a siren alone may be able to alert people but there needs to be more information so that people can take appropriate action fore the situation. Relying on emergency services people going door to door is a very slow process and hoping the media will alert and inform people is not a sure thing. All parts fit together to provide a more complete alerting function.

There needs to be a diversified alerting system so there is no one single point of failure. If we rely on one radio station to provide the detailed information and a tornado removes that station the system fails. There needs to be a variety of media involved. This includes all radio and TV and internet sources that make sense in the local area. The siren technology is one part of the puzzle and may be one of several means to initially alert the public that there is a problem. The siren system enhances what is available but it alone will not adequately alert the population so that they are able to react to the specific situation.

System design and performance

The wireless siren system uses two-way radios operating on VHF to communicate between two computer controlled points. The Central Control Unit (CCU) is located where it can be activated by authorized staff on a 24/7 basis. The CCU can be controlled by software through a PC or through a touch pad on the front of the unit. When activated the radio signal travels to the siren speaker station where it is interpreted by the computer in the siren station and the appropriate activity is performed. This may be activating a tone, discontinuing a tone, polling the radios, or re-setting the system. The radios can also relay status reports from the speaker station.

The following diagram shows the location of the speaker station, CCU and the radio system antennae that was used in the testing of BEAP. The decibel readings that are located on the diagram correspond to those recorded by BEAP during the testing of the alternating steady (High low) tone. These were the best results that were obtained and this tone was also subjectively judged by the test team as the one that was best at getting their attention.


City of Brandon Siren Test
Alternating Steady (High / Low)
Siren Location
Control Unit
Radio
VANHORNE
VAN HORNE
INDUSTRIAL
PARK
GARWOOD
QUEENS
Richmond
Rosser
Victoria
Louise
PACIFIC
CORNELL
PTH 110
90
85
80
75
70
65
0.4 0.2 0 0.4 0.8 1.2 1.6
Kilometres
Alternating Steady Measuring stations
Test Area

Equipment used in BEAP

The following equipment was designed and purchased from Acoustic Technology Incorporated (ATI), 30 Jefferies Street, East Boston, MA, U.S.A., 02128.

- One High-Power Speaker Station - Model HPSS16. With integrated RC for UHF/VHF radio communications with Central Station, antenna and antenna surge suppressor. Custom configured speaker head. Capable of producing various tone signals and live voice broadcasts. Standard power feed of 120V and battery back-up operation in the event of power loss. NEMA - 4 enclosure of painted metal.
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- One strobe light. Mounted at the top of the siren.
- One wireless interface to key facilities.
- One Tone Alert Receiver

Speaker Station

The speaker station is made up of computerized components that interface with a VHF radio that receives a signal from the Central Control Unit and in turns sends an amplified tone to four 400 watt speaker horns. The speakers are mounted on a 60 foot wooden pole and face in four directions. Functions for the first series of tests were set as follows:

- Alert Tone - steady high pitched tone
- Speech – not available from speaker station
- Growl Test
- Silent Test – 10 khz tone
- All Clear – high low tone
- Pulsed steady tone
- Alert Test - Westminster Chimes
- On/Off

Functions were changed on October 15, 2003 to provide the following tones:

- Alert Tone – Red Alert (air raid)
- Speech – not available from speaker station
- Growl Test
- Silent Test – 10 khz tone
- All Clear – Westminster Chimes
- Pulsed steady tone
- Alert Test - high low tone
- On/Off

Performance

The speakers produce loud, crisp and clear tones in all cases. Some tones were better heard than others. The alternating steady tone (high low) was picked by the public and test team as the most effective at getting people's attention. It was not, however the tone that people felt most likely to indicate an emergency. That was the red alert (air raid). This is a matter of interpretation of the affect on people as the siren played all tones well.

The equipment takes approximately 15 seconds to switch from tone mode to voice PA mode. The screen clearly identifies when the PA mode is loaded and ready. The announcement is then as simple as keying the microphone and speaking into it. The degree to which people heard the live voice public address broadcasts depended on their specific location. This is very susceptible to becoming distorted by bouncing off and around buildings and in having the sound absorbed by leaves on trees. Some broadcasts were hampered by wind but during the fall testing the wind did not have as big an impact. The controlling factor seems to have been temperature and a lack of foliage. The colder it was the easier it was to hear the broadcasts. For example the public address announcement was clearly heard from a distance of 1,000 feet, 2,200 feet, 2,700 feet, and 3,000 feet.

Many times test members said they could hear something but could not understand what was being said. The broadcaster was very careful to speak very slowly and very clearly.

Equipment Protection

The speaker cabinet door seals well. There was a problem with water inside the cabinet following a rain storm. A hole was drilled in the bottom of the cabinet and the water drained out. It appeared that water had entered through a screw hole that had been used to fasten the cabinet to a piece of plywood. The seam along the top of the cabinet and the plywood was caulked and this stopped the problem. There were no problems with dirt or insects entering the cabinet.

Local and CCU Status Reporting Capability

The local speaker station has no easy display of its current status. Technicians can recognize and read distinct light patterns on the motherboard as indicative of equipment status.

Both the monitor, through the software, and the front face of the CCU, display the status of the equipment. Both are easy to utilize and understand. The software uses a Dialog-box to provide a status report for the speaker station including identifying number, number of speakers, amps, and strobes, type of speaker, location, last activity, and operating status. This information is easy to access and edit. A System Status report can be generated that lists speaker station(s) in numerical order. Other reports include a history of radio activity in the Communications report, and an Alarm Summary report.

Display of Systems Activation

The monitor, through the software, displays the activation status. Once a requested activation has been released by the user, the Activate window appears and shifts the map to the right. This displays the type, address, location the activation was sent from, and the elapsed time of the activation. On the Map window a white circle appears around the siren station location to indicate the most recent activation. It will then turn yellow to show that it is not yet verified. Once it receives the signal and is activated it turns green. If it does not verify it will turn red and you know that speaker station is not activated. When the activation has ended the speaker station is again polled to determine its status. The map will again change colour to indicate success or failure in the activation.

Silent Test
Silent tests were performed and the equipment found to function appropriately. The start/stop function was tested from the speaker station, CCU front face and through the computer software. Each test was successful. The CCU and monitor accurately displayed the silent test function. The speakers produce a very low growling sound that last for several seconds. This allows for testing of the equipment without disturbing anyone and indicates that everything is operating correctly.

Power Supply and Back Up
The system has a built in back up power source by virtue of the way it is powered. The AC power supply is used for two purposes. The first is to charge the batteries so the DC powered siren equipment will operate. The second is to heat the cabinet box to prevent the equipment and batteries from freezing. The heaters were activated in mid-October. They have been set to 15 degrees Celsius and have functioned as designed. The batteries are what power the siren. If they are not being charged by the AC system, they keep the system operable on standby for 5 days. When not being charged, the batteries are expected to activate the system for a period of 30 minutes without AC power.

Control Station
The Central Control Unit is made up of computerized components that interface with a VHF radio. The siren station activities are chosen by scrolling and selecting actions from a keypad controlled menu on the front of the unit. These actions are communicated to a radio located at the siren station. The CCU is also connected to a PC that provides for controlling the system by selecting various actions in a windows based environment.

Activation and Deactivation Performance
The CCU functioned properly during all pre-tests and during actual testing. The system polls the radios and immediately makes contact and re-sets when an abnormal condition exists such as the siren station door having been opened. All controlling functions of the CCU worked properly. The siren could be activated and deactivated as required. This was tested successfully both through the software and the CCU control pad.

Having remote wireless access to the activation/deactivation process means that personnel such as police dispatchers who are on duty 24/7 can operate the system as part of their regular duties without leaving their work area. This becomes more of an advantage when there are several speaker stations locations that need to be controlled. The wireless aspect means that installation and maintenance does not need to be concerned with a system of wires to control a variety of activation patterns should only a portion of the sirens need to be activated.

Self-diagnostics and Remote Station Status Reporting
The CCU through the software program is able to perform a series of self-diagnostic tests that indicate potential problems. This is done by polling the speaker station(s) to determine their status. Possible conditions include:

- Normal
- Abnormal:

    - could have failure of 24 Volt DC problems
    - could have failure of battery charger
    - could have problem with speaker station synchronization
    - could have a door open signal
    - could have normal standby position of the speaker station
    - could have communication link failure
    - could have over-current problem
    - could have low voltage on batteries and station shut down
    - could have thermal shutdown
- Out of Service
    - means all statuses are not right
- Success
    - means from the activation menu the speaker station is able to be activated
- Failure
    - means from the activation menu that the status is not right.

Silent diagnostic tests were conducted the day before and the day of each of the siren test dates. The test functions were accurately displayed on the computer screen. When asked, the system polled and re-set the radio connections on the first attempt and displayed normal radio contact each time. Open door indication was re-set on the first attempt each time. The system's ability to perform self-diagnostics is imperative to the assurance that the system is operable and indicates that a problem is present. This allows for investigation of the problem and for timely repairs, re-setting, or adjustments as may be required.

Stop/Start Function

The system can be started and stopped through the computer program. Functions include Alert, Alert Test, Growl Test, All Clear, Public Address, and Silent Test. Once the activation button is release the Activate Window appears. The user chooses a "total activation" or may select certain stations if more than one is in place. The user may cancel the request or press send to release the activation. The siren is activated within 5 seconds.

The system can be controlled manually through the CCU front face keypad. It has the same functions as the software. The user then decides to proceed with the activation or to cancel it by pressing another button. The system can also be controlled in a more basic manner from the speaker station. Pressing individual buttons produces an immediate response. In all instances the activation can be cancelled very easily and quickly. Two delays were noted:

1. An approximate 15 second delay for the PA mode to load
2. A delay in being able to re-activate a tone when the tone has ended but the timer has not yet run down.

Printing Capability

The system is able to print reports on the activation history, system status, and communication history. Printed information can be used for review at a later time and

away from the confines of the control centre. The information can also be reviewed from the screen.

Software
The software was custom designed using an electronic map supplied by the City of Brandon and operates best with Windows 2000. The software was very easy to load and use. It worked flawlessly during the testing. The software displays the activation status. Once a requested activation has been released by the user, the Activate window appears and shifts the map to the right. This displays the type, address, location the activation was sent from, and the elapsed time of the activation. On the Map window a white circle appears around the siren station location to indicate the most recent activation. It will then turn yellow to show that it is not yet verified. Once it receives the signal and is activated it turns green. If it does not verify it will turn red and you know that speaker station is not activated. When the activation has ended the speaker station is again polled to determine its status. The map will again change colour to indicate success or failure in the activation.

The software allows for easily resetting the system for polling the various speaker stations. Once this is done if indicates if the functions are normal or abnormal. See Self-diagnostics and Remote Station Status Reporting above. Adding additional speaker stations is a simple process.

Radio link
The system that BEAP used was based on a VHF radio link that was a frequency used by the Brandon Regional Health Centre. It is possible to use an 800MHz link instead. The VHF link was chosen as the system was presently established and air time was not an added expense as it is with 800MHz systems. The siren system did not interfere in any way with the BRHC base station or any of the radio transmissions made the BRHC. The radio in the CCU and in the speaker station communicated effectively. The public address announcements made from the CCU were clearly received and broadcast at the speaker station and by the Tone Alert Receiver.

Alerting indoor facilities was tested using the Tone Alert Receiver which is essentially a one way radio receiver. It is able to receive the public address announcements made over the siren system. It does not play the siren tones. The Tone Alert Receiver was confusing to understand and operate. It is difficult to see if the tone monitor button has been pressed in or not. The position of this button determines if the device will receive and play the public address announcement made through the siren system. Since this device can so easily be deactivated it is likely to be subject to inadvertent tampering by the compulsive button pushers of this world.
The Tone Alert Receiver functioned properly in all but one of the siren tests. On October 17, 2003 the TAR was positioned inside the CKX TV building and was unable to pick up the voice broadcasts. The TAR was later tried outside of the building but was even then only barely able to pick up the message and then it was not easily understood.

In other testing of the TAR the results were mixed (Appendix L). Of the 15 locations

tested 9 reported the communication as loud and clear; 2 reported the communication was clear with some static; 2 reported the communication as barely audible but not understandable; 1 reported communication connection was not successful; 1 communication was not successful as the TAR had been turned off. Some locations seemed susceptible to either a weak signal or interference that made the message very difficult or impossible to hear. It was also found that the reception of the Tar could be improved by changing the direction of the aerial and by placing it near a window. In most locations the device worked better outdoors if it was non-receptive indoors but even then it was subject to a lot of static.

When the computer was switching to the PA mode there was considerable squealing and loud radio sounds. Some people in the immediate area found this disturbing and stated they would turn off the equipment if it made noises like that very often.

There was occasionally some radio talk that could be heard in the background. It is believed to have originated from the Brandon Regional Health Centre whose radio frequency BEAP is broadcasting on. The BRHC reports that there was no interference with their broadcasts and their radios did not pick up BEAP announcements.

Strobe
The high powered strobe provided by ATI was rated at more than 1000 candela efficiency. It is a white double flashing light that operates on a 24 volt system through the siren system.

The strobe light was activated during each of the tests. It did not prove effective at alerting people until the sun had completely set but once set and with a direct line of sight, the strobe was very noticeable. Test members felt that the strobe light should be mounted so that it is as high as possible and therefore more likely to be seen. There was no reflection of light off of any surfaces that was significant enough to attract attention so the strobe is not likely to be effective at waking people up or attracting their attention while indoors.

Security
Unauthorized access and activation of the siren is prevented through password protection of the software but the CCU has no security safeguards and can be activated from the front scroll panel. For this reason the CCU must be kept in a secure area that is accessible only to authorized people.

The cabinet at the speaker station is locked but once opened the siren can be activated by pressing an identified button. The software records every time the speaker cabinet door has been opened but does not activate an intrusion alarm.

Acoustic
Several different alarm tones were tested.

- Alternating Steady. Referred to as the high/low tone. This sounds similar to European emergency response vehicle sirens. This was the most effective tone.

The alternating sound was identified as an emergency signal but some people confused it as an ambulance. The alternating tone was preferred by the test team as most likely to get their attention. Probe found 84% of respondents said this tone was the clearest.

- Red Alert. This sounds like an air raid siren. Test members reported that this was effective when located close enough to hear the entire cycle. Those at a distance experienced a burst of sound for a few seconds and then silence as they heard the peak of the wailing. In the public survey 71% of respondents said this tone was recognized as an emergency.
- High Pitched Steady. This sounds similar to what is played on TV during a test pattern. This was the least effective tone tested. A single frequency tone has the potential to travel a great distance but anyone with hearing loss in this frequency will not hear it. BEAP found this tone did not catch people's attention even though they heard it. It was not clearly identified as an emergency tone.
- Westminster Chime. This is the chime heard on many tower and mantle clocks. It is most often used in alerting to send an "all clear" message.

Sound Quality and Pattern

The quality of the various tones played by the siren was consistently crisp and clear. The alarm tone radiated out from the central location fairly consistently until it was impeded by foliage or buildings. This was especially noticeable in the last test where decibel levels increased by as much as 10dB in some locations as compared to testing when leaves were still on the trees.

The threshold for stating that the tone was noticeable is generally at 70 decibels but it does depend on the style of tone used and conflicting background sounds. The 90 decibel level reaches a distance of approximately 1700 feet from the siren. The 85 decibel level is approximately 2200 feet from the siren however within this area several points registered in the mid 70's. The 75 decibel level is approximately 3000 feet from the siren however within this area some points are as low as 67 and as high as 87. See the map on the following page.

Volume and Tone Clarity

Probe Research reported the clarity of the alarm was viewed differently during different waves of data collection. The alternating steady (high low) tone received the highest accolades and was rated as "very" or "somewhat" clear by 84 percent of those surveyed in wave four, followed closely by the wave three alarms (81%) which was also the alternating steady tone. This finding was supported by BEAP test team members who chose this tone as the best one at getting their attention.

Decibel Levels

As a general rule deficient decibel levels were found in those areas located near localized noise that competed with the siren tone. This happened near heavy traffic, trains, industrial operations, and construction sites outdoors. A similar situation was found indoors any where there was competing noise. Additionally the position of buildings in

relation to the siren so that sound was blocked had a detrimental affect. This was especially noticeable around the Health Centre and the Emergency Services College.

The only area where the decibel level would be described as excessive was in the immediate area of the siren station. With decibel levels in excess of 90dB, technicians in this area wore hearing protection.

Live Public Address.
Live public address announcements were made in each test. The announcer spoke from the CCU microphone. Normal speech pattern was tested during the PA broadcast of test #4. Most test team members reported the broadcast as jumbled. In test #5 and #6 the Project Coordinator used a much slower and more deliberate delivery than one would normally use. More test team members reported understanding the message. Those who were farthest away or around building were the sound bounced around, reported being aware of an announcement but were unable to make sense of it. Earlier broadcasts (test #1 and #2) were hampered by wind but during the Fall testing the wind did not have as big an impact. The controlling factor seems to have been temperature and a lack of foliage. The colder it was the easier it was to hear the broadcasts. For example the public address announcement was clearly heard from a distance of 1,000 feet, 2,200 feet, 2,700 feet, and 3,000 feet.

The equipment takes approximately 15 seconds to switch from tone mode to PA mode. The screen clearly identifies when the PA mode is loaded and ready. The announcement is then as simple as keying the microphone and speaking into it.

During test #4 the PA announcement following the initial tone activation was not broadcast through the speaker system but was heard on the Tone Remote Receiver that was located at WESTCO which is approximately 3 kilometres from the speaker station. The PA functioned properly following the second tone activation. This was the only occasion that the PA system failed to perform as expected. There is no indication at the CCU that the message was not being broadcast.

Stop/Start Function
The speaker station was easily and accurately activated and disengaged by using the buttons on the panel in the speaker cabinet. There is no public address function from the speaker station.

<u>Other Equipment</u>
Encoder
The system was able to interface all components. The data transmitted by radio was correctly interpreted by the equipment receiving and in turn this activated or deactivated a function at the speaker station. The CCU was able to request and receive data to and from the speaker station. The various devices communicated all but one time, that being one failure to broadcast a PA announcement. A Communication report can be generated through the software that provided the history of radio communication.

Computer
The computer was a Pentium II 400 MHz, 10 Gig hard drive, 128 MB RAM, 3.5 floppy drive. It functioned well. The computer interfaces with the CCU to control the speaker station operation. This includes start/stop function of the tones and self-diagnostics of the system. These all worked as expected.

Monitor
The monitor was a 15 inch VGA monitor. This worked adequately considering that there was only one speaker station involved in this testing and therefore one location plotted on the map. With more locations plotted a larger screen would make it easier to view the entire map at once and to instantly assess the status of various speaker stations.

Tone Alert Receiver
The tone alert receiver is able to receive the public address announcements made over the siren system. It does not play the siren tones. The Tone Alert Receiver was confusing to understand and operate. It is difficult to see if the tone monitor button has been pressed in or not. The position of this button determines if the device will receive and play the public address announcement made through the siren system. Since this device can so easily be deactivated it is likely to be subject to inadvertent tampering by the compulsive button pushers of this world.

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When the computer was switching to the PA mode there was considerable squealing and loud radio sounds. Some people in the immediate area found this disturbing and stated they would turn off the equipment if it made noises like that very often.

There was occasionally some radio talk that could be heard in the background. It is believed to have originated from the Brandon Regional Health Centre whose radio frequency BEAP is broadcasting on. The BRHC reports that there was no interference with their broadcasts and their radios did not pick up BEAP announcements.

Display of Systems Activation
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The CCU also displays the activation status with a light and on the front face display. Without the map it is somewhat more difficult to determine the activation status. This would be especially true when several speaker stations are in place.

Software
The software was custom designed using an electronic map supplied by the City of Brandon. The software was very easy to load and use. It worked flawlessly during the testing. Adding additional speaker stations is a simple process.

Radio Link Performance
The VHS frequency in use for the testing was the Brandon Regional Health Centre's Security system frequency. The siren system did not interfere in any way with the BRHC base station or any of the radio transmissions made the BRHC Security (see TAR above). The radio in the CCU and in the speaker station communicated effectively. The public address announcements made from the CCU were clearly received and broadcast at the speaker station and by the Tone Alert Receiver.

Security
The software is password protected. The CCU has no security safeguards and can be activated from the front scroll panel. The CCU must be kept in a secure area. The cabinet at the speaker station is locked but once opened can be activated by pressing an identified button.

Cost and maintainability
Cost effectiveness is something that each community will need to determine on their own. To establish a central control unit with software and computer costs approximately $25,000. Each speaker station can cost up to $30,000 depending on the power of the system and the installation costs. The number of speaker stations depends on the size and topographical layout of the area. During BEAP the siren system notified approximately 40% of people in the area. Brandon is establishing a committee made up of community members, the City and B.E.S.T. to determine if a system like this is something the community wants to afford. The community will determine for itself what the appropriate cost is.

The siren system is very user friendly for anyone who is familiar with computers. Some

activities such as polling siren stations seem foreign until the user realizes what it means. Activating and deactivating the system is very straight forward.

Reliability
To date the siren system has proven reliable and functioned as expected. The same cannot be said for the Tone Alert Receiver which experienced several reception difficulties. See Appendix L.

3. BEAP SECURITY MEASURES

Unauthorized access and activation of the siren at the CCU is prevented through password protection of the software but the CCU itself has no security safeguards and can be activated from the front scroll panel. For this reason the CCU must be kept in a secure area that is accessible only to authorized people.

Although the metal box at the speaker station is locked by padlock and specialized entry keys to open the door, once inside, the siren can readily be activated by pressing an identified button. The software records every time the speaker cabinet door has been opened but does not activate an intrusion alarm.

4. RECOMMENDED SECURITY MEASURES

To ensure complete security and accountability for all activities with the siren system it is necessary to locate the CCU and computer in an area with access restricted to authorized personnel.

An intrusion alarm should be installed at the speaker station that also prevents the siren from being activated and sends an intrusion message to the control station so that it can be immediately investigated.

Additional security around the siren station may be required depending on its location. This may include a metal fence or other such device to impede access to the speaker control panel. If it is located on a secure building this may not be a concern as compared to a more isolated location.

5. DEVELOPING A SIREN SYSTEM IN A CANADIAN URBAN CENTRE

The key to developing a siren alerting system or for that matter, any alerting system, is to get the community involved. More than anything else alerting the public is a social act. One that recognizes the risks associated with living in a modern urban area and that acknowledges that the community itself has a role to play in appropriately responding to any hazardous situation. The ingredient that a siren provides in this is the ability to alert the public that something is happening and they may need to take some action.

You also need someone in the community with a vision of how the community can be improved by having an alerting system. You need a champion for the idea of community emergency alerting who can spark the desire and interest in numerous people. That person will be able to frame the idea in such a way that it makes more sense to have an alerting system than not to have one.

Brandon has a partnership with business and industry to develop and provide emergency preparedness information. Relationships like this are the foundation upon which community support is established. Community input is further enhanced by the formation of community based focus groups that are willing and able to provide input. BEAP made good use of both groups who provided information and volunteer human power to conduct the field testing of the siren.

Once the idea has taken root you need to develop an implementation plan.
1. Set a goal and the objectives that will have to be met to reach the goal

2. Install the siren system and radio links.
Consult with product suppliers and their satisfied customers until you locate a system that will meet your needs.
Determine equipment needs.
Determine a delivery schedule.
Determine desired locations for the sirens.
Consult property owner(s) regarding installation of equipment
Consult Hydro regarding installation
Receive equipment.
Notify installation team of equipment readiness
Install and adjust siren.
Provide Media Release to siren installation.
Hold Media event at installation.
Coordinate siren system training for key personnel.

3. Introduce the project to the community.
The project will have been introduced to some members of the community through the various committee meetings and events.
The project will be introduced to the community at large through various meetings.
Public Education Campaign will be launched as per schedule (see Public Education Campaign Plan).

4. Seek guidance from focus group.
Solicit feedback and support for the concept.
Review draft project plan.
Solicit response and suggestions for improvement.
Review possible roles for committee.
Solicit volunteers for those roles.

5. Conduct siren tests.
Siren tests will be conducted.
Project Team to select and confirm date and time.
Select tone and/or voice message to be used.
Determine duration of test
Determine sound pressure level (SPL) sampling locations.

Select Testing Team volunteers.
Conduct orientation training session for volunteers.
Assign trained volunteers to gather data.
Provide assessment locations.
Provide equipment for gathering data.
Provide forms for recording data.
Assess tones for performance.
Volume.
Clarity.
Length of tone.
Assess live PA broadcast for performance.
Volume.
Clarity.
Length of message.
Assess strobe light for performance.
Intensity.
Reflectivity off of surfaces.
Attention grabbing ability.
Assess control unit for performance.
Stop/start function.
System self-diagnostics.
Computer functions.
Monitor display.
Display of system activation.
Software use.

6. Evaluate siren tests.
Sound Pressure Level information is forwarded to siren supplier for a technical evaluation.
Supplier provides a brief report.
Supplier may recommend adjustments for subsequent tests.
Research company to conduct surveys to gather public response to tests.
Survey is refined to clarify issues to be evaluated.
Integrate relevant demographics.
Public consultation.
Draft, review and finalize questionnaire instrument.
Pre-test questionnaire for communication & data capture.
Prepare phone bank to facilitate random digit dialing (RDD)
Survey is conducted.
Evaluate with project manager.
Report findings to test team.

7. Conduct equipment tests.
Silent alarm testing.
Local speaker and central control unit status reporting.
CCU start/stop function.

Local speaker start/stop function.
Display of system activation.
Central Control Unit testing.
System self-diagnostics.
Computer functions.
Monitor display.
Display of system activation.
Software use.
Radio linkages to the tone remote device tests.
Select location to be tested.

8. Evaluate equipment testing
Encoder function assess for ability to interface control station and base station.
Tone remote.
Ability to interface control station and base station

9. Prepare reports.
Project milestones.
Test size.
Location.
Demographics.
Duration of tests.
Technical report.
Acoustic performance.
Decibel level and pattern.
Speaker station performance.
Alarm tone.
P.A. broadcast.
Local speaker and central control unit status reporting.
Local speaker and central control unit silent test.
Power supply and back up.
Control station performance.
Start/stop functions.
Self-diagnostics.
Encoder.
Computer.
Monitor.
Display of system activation.
Software use.
Radio link performance.
Interface with control station and base station.
Strobe performance.
Type.
Size.
Wattage of light tested.
Security assurance.

Technical, operational and policy issues.
Solutions.
Lessons learned.

10. Assess public education campaign.
Public reaction to the project
Public participation in the project
Positive and negative information gathered/received by media partners
Positive and negative information received by Project Team members
Positive and negative information received by Mayor and Councillors
Specific questions in the telephone surveys
Input from focus group
Input from partner groups
Assess public education events conducted.
Assess educational messages sent out to the public.
Assess effectiveness of public education events conducted.
Assess level of awareness and knowledge of the public as a result of this campaign
Determine best practices and lessons learned.
Determine public education barriers encountered and solutions used.

6. IMPLEMENTING A SIREN SYSTEM IN A CANADIAN URBAN CENTRE

The implementation of the siren system is accomplished by following the implementation plan as outlined. As things progress there will be items or events that alter the schedule but overall the plan has proven to work.

7. POSSIBLE TECHNICAL ISSUES AND SOLUTIONS

Following the installation of a new M-Prom to allow for testing of the Red Alert tone the indicator for speaker activation time did not directly correspond with what was actually happening. For the high low tone the signal ended while the time indicated it was still active for an additional 15 seconds. This is a technical issue that the siren manufacturer must address.

During a test one PA announcement was not broadcast through the speaker system but was heard on the Tone Alert Receiver. The next broadcast and all subsequent PA announcements were broadcast properly. The concern is not so much that the broadcast did not take place but that there was no indication at the CCU that the message was not being broadcast. This is a problem that should be addressed so that the operator is certain that the message is being broadcast at all speaker stations.

The functioning of the tone alert receiver depended on the location of the device. It was more effective at receiving transmissions when located out of doors. More testing is required to determine if an external aerial would improve reception. While the idea of a device like this is a good one it needs to be extremely reliable. Further testing is required to ensure the reliability of the device in locations where buildings appear to have an impact on the ability of the TAR to receive a broadcast message. At a minimum an antenna that can be mounted outside of a building should be tested to determine if this

improves reception to an acceptable level.

The tone alert receiver does not have a battery backup so if the hydro is off, the device will not function. The practicality of having battery back up should be explored as this would greatly enhance the reliability of the device.

The tone alert receiver was also found to be confusing for a non technical person to operate. Team members were never certain if the device was on or off. The device could be modified so that it is simpler to use. The device should have two control switches. One for on and off with an indicator light and a volume control switch that can be turned down but not completely off.

8. POLICY TO ACTIVATE AND DEACTIVATE THE SYSTEM

This is a policy issue that needs to be addressed and will be as Brandon progresses with its alerting system development. Work has been done in this regard by Alberta in their public warning system program. Their publication, *Authorized User and Broadcaster Handbook* outlines their alerting protocol. Work has also been done by the Partnership for Public Warning who are in the process of developing a community alerting protocol that may be used to establish national standards for public alerting. The Partnership for Public Warning presently has a draft document that was open for public comment until November 30, 2003 at www.oasis-open.org.

Policy development needs to address;

a. who is authorized to activate the system

This obviously needs to be someone who has access to the system 24/7 and has the training to determine that the system needs to be activated. Municipal areas such as police communication centres or 911 communication centres are appropriate. These staff may make a determination to activate the system or may be directed to activate the system by someone in authority. This authority may be given to industrial personnel who are first on scene and determine that the public needs to be alerted. It may also be authorized by municipal emergency response personnel or the local emergency coordinator.

b. on what basis is a decision to activate made

The decision process for alerting should be simple and straightforward. Alberta uses the following:

> An authorized user may activate the system when at least one or more of the following threat conditions are present:
>
> - The life or safety of groups, neighbourhoods or communities of citizens is at risk
> - The danger to the community is impending and widespread
> - The potential impact on the community is catastrophic
> - The general public needs to be informed of critical, life saving information.

c. how the system is accessed

Access to the system will depend on local organizational and policy issues and on the limiting technical capabilities of the system. In the case of the wireless siren

system the system is accessed through the central control unit by designated personnel. The CCU would be located in a secure area to which designated personnel have easy access.

d. what the message says

In the case of the siren tone or strobe light the message that is to be understood by the public is that upon hearing the siren or seeing the strobe light, they are to turn on a radio and tune it to a local station. This message is part of a public education campaign.

The voice message that is then broadcast by the media must include both alerting information and action information. General sets of information would be developed for groups of identified hazards within the community. These sets of information would follow the general outline used by Alberta:

- Identify who is providing the alert
- Provide a brief description of what has been observed or reported
- Give clear location and direction descriptions
- Indicate the area believed to be at risk
- State what you want people to do for protection

e. the frequency of activation

The siren tone is active for 3 minutes each cycle and will be followed by a simple voice announcement. The siren/voice cycle will be repeated a minimum of 3 times. This will help people confirm that they have in fact heard the siren and need to take the next step by listening to the local radio.

f. what training is provided

A training program would be developed that would include:

- The concept of public alerting and the local situation
- Review of the alerting policy and protocol
- Equipment familiarization
- Hands on demonstration and practice
- Alerting exercise
- 6 month refresher with hands on practice

g. what information is provided after the alert

Follow up information will be provided to the public through the Emergency Public Information Team operating out of the municipal Emergency Operations Centre. It will include:

- Updated information about the situation
- Actions people can and should take
- Where support services are available
- Expected duration of the emergency
- Providing an “All clear” message
-

9. VOICE MESSAGES

PA announcements can provide valuable information to certain areas. The main point with voice messages that are to be broadcast through the speaker system is that they must be short, simple and delivered slowly. It is very important to speak slowly and clearly. A rapid speech patterns quickly becomes a jumble of words that are unintelligible and is made worse the further it travels. This was the experience with BEAP where the further that test team members were from the speaker station, the less likely they were to understand the message. At times they reported hearing the voice but were unable to understand what was being said. The voice messages were also impacted by the presence of building which caused the sound to bounce around and quickly made every message unintelligible.

The best way to optimize PA messages through a speaker system is to use a short message that is delivered abnormally slowly. This proved most effective during BEAP testing. People are more inclined to listen intently to hear a distant message if they can make sense of it but people will give up on a long, complex message.

Overall BEAP's experience is that detailed alerting voice messages over a PA system have limited use due to the voice distortion. A siren system is ideally suited to alerting people that something is happening and they should look further for what actions to take. Instructive messages can not effectively be delivered over the entire system.

Voice messaging that is received by the Tone Alert Receiver is more effective but is the same broadcast as provided through the speaker stations and is therefore slow and short on content.

10. ADVANTAGES AND DISADVANTAGES OF SIREN SYSTEMS

The siren can quickly notify the population that something is going on. The present alerting system involves emergency services personnel going door to door and the media broadcasting information. The two systems work well together and enhance each other.

The siren system is effective at notifying approximately 40% of the population within a very short period of time. Compared to the present emergency personnel/Media system, the siren is significantly more efficient at alerting a large number of people very quickly. A siren is more intrusive than Radio or Television and is therefore more efficient at getting peoples' attention. However, compared to the present system, the siren is less efficient at delivering information about what is happening and what people should be doing in response. In a multi-hazard world a siren alone may be able to alert people but there needs to be more information so that people can take appropriate action for the situation. Police and fire personnel going door to door and the Media are both better able to explain the situation.

People with hearing loss in frequencies that the alerting tone operates will be less likely to hear the alerting tone. The more efficient tones are those that run through a range of frequencies. This siren system is able to accommodate a variety of tones playing in a variety of frequencies.

The local authority has access to personnel, such police or fire dispatchers, who work 24/7. Procedural requirements for the siren system can easily be established as this group of professionals is accustomed to developing and implementing emergency related procedures. These areas also come with the advantage that they are already secure and have restricted access.

The local authority should and does have control over the siren system. It can then determine the user group and set standards for use. It does mean that the local authority takes the responsibility for the system if it malfunctions and will be the ones explaining the problem. It also leaves the local authority with the task of maintaining a good working partnership with the user groups to ensure that community is on side with the need and associated ongoing costs.

The siren system is scalable and therefore can be expanded as the area requiring alerting grows. Scalability is dependent on the capacity of the software. BEAP has capability for up to 20 speaker stations.

The radio link provides the advantage that in installation and maintenance there are no wires to worry about. In multiple siren installations, the radio link and software allows the system to easily configure a variety of siren activation locations. While possible with a hard wired system it is highly impractical to hard wire every possible combination of siren activation that may be required. The radio link also allows for any number of remote devices to be located in key facilities to ensure that those inside are aware of the alert. Hardwiring such devices while possible may not be practical.

11. ISSUES REGARDING USING A SIREN SYSTEM AND BROADCAST MEDIA IN ALERTING

Since the siren system is not effective at providing instructive messages it is necessary that a supporting system be in place to augment an alert. The siren notifies people that something of import is about to happen or is happening. They then turn to the local media for up to date response information. This supportive partnership works well to enhance the overall alerting potential of the system.

A technical/policy issue that needs to be dealt with is the fact that most commercial radio stations operate automatically in the evening and nighttime shifts. That is there is no one in the station buildings from 7 PM to until approximately 5 AM.

There are a number of possible solutions to this issue. The local authority could be provided with the necessary permission and equipment to broadcast over the existing commercial radio frequencies as is done in Alberta. This would allow for designated personnel to provide an on air message from any touch tone telephone provided the correct password was used. Alberta has a mechanism whereby designated people from local communities as well as provincial and federal government employees have access to a system that allows them to make voice broadcast messages that over-ride live on-air programming. They have a series of criteria to follow to do this and provide training to ensure the system is used appropriately.

A similar system could be established with the exception that the message is provided by radio station personnel who are available by telephone 24/7 and can be contacted by designated officials and requested to send a certain message. One advantage with this change is the person making the message is a trained professional who is more able to provide the information without emotion seeping into their voice.

The municipality could establish and maintain its own local area FM frequency radio station. To ensure that the public are familiar with this service, the station could regularly broadcast community event information as well as emergency preparedness information. The service could be managed by the tourism board with over-ride capability by designated staff to make emergency messages.

Radios and or televisions could be provided with a function that automatically turns them on when an emergency broadcast comes on. This would help notify people in the night time hours who do not have their radios and televisions turned on. The equipment could also be equipped to so that the emergency broadcast over-rides programming and provides the emergency message.

Access to multiple and addressable media systems within a given area could be obtained through satellite technology. To get the alert started it could activate the siren system and activate specified telephones to alert key local people. Messages could then be placed on all radios and TV's within a given area. This coupled with equipment that automatically turns it self on to receive and deliver an emergency message could be very effective. An advantage with an integrated system like this is the municipal official has only one point of entry to access multiple alerting methods.

12. COORDINATING A SIREN SYSTEM AND BROADCAST MEDIA IN ALERTING

The major ingredient in coordinating s siren system with the supporting media system is to develop a relationship that supports a partnership. This is done by talking to the players and getting people on side so that they fully understand what you are trying to accomplish and what their role in the process will be. A well run media campaign to introduce the siren system and to keep the public up to speed on its use and purpose will naturally lead into the important role that the media can play.

The importance of having the media on side as a partner can not be over stressed. It is absolutely critical to the success of your public education campaign. The media in many ways is the voice of the community and when you have this group working together spreading your message in one unified voice it is very powerful. The public are used to getting their information through the media and look to them for the story. People will seek out several different sources of information to verify that what they are learning is correct. When the entire media community is saying more or less the same thing about your program it takes down a lot of barriers. The media are experienced communicators and know their market. Spend the time to get them on side it is well worth it.

When approaching the media for support, be sure to be prepared. Have a clear idea of what you want to accomplish and why it will benefit the community. The media have a great sense of community purpose and if you can demonstrate that your program will benefit the community they will be much more inclined to be on side. But good ideas are only half the battle. You must be well organized and have your plan well thought out. They are skilled at helping you sharpen your idea into something that the public will understand so make sure you know what you want. If you can not explain it to them, they will not be able to do any better with the public. Be prepared, do not waste their time.

The media can provide a wide variety of resources to your project but it should be expected that they will all come with some price attached. There are relatively few free media community services. These include community bulletin boards on local cable television which are presented on a monthly basis. Local cable channels also provide for self-produced interview programs that are broadcast intermittently and have a limited audience. Commercial television, radio, and print media will also conduct interviews provided the material is of interest but will only provide the material on a one time basis. The municipality may be able to provide "free" space in the mail with water and other bills but the insert must be printed and this has a cost as does staff time to stuff the envelopes. Municipal web sites and their pages are "free" although there is a cost to developing and maintaining the service.

13. ALERT TRIGGERS

The siren could be activated for the following situations:

Natural Hazards

- Flooding
- Tornadoes
- Extreme Wind
- Wildland fire

Technological Hazards

- Hazardous Materials release
- Explosion/Fire
- Rail emergencies
- Water Utility failure/contamination
- Hydro failure
- Dam failure
- Extreme Air Pollution
- Road emergencies
- Air emergencies
- Natural Gas failure
- Building/Structure collapse

Human Hazards

- Eco terrorism
- Chemical terrorism
- Radiological terrorism
- Biological terrorism
- Nuclear terrorism
- Resource shortage

14. BEST PRACTICES & LESSONS LEARNED

Plan

Do not start anything without first developing a plan. Know what it is you want to accomplish. Write a goal and some broad objectives to meet that goal. Think about who can help you and what they can do.

Individual Meetings

Meet with your potential partners individually so that you can spend time with them to be certain they know what you are planning to do. If this is a media partner and you want to establish a team made up of them and their competitors make sure they know that. Remember these are different businesses who may not necessarily share everything they do. Be very honest and direct about what your hopes for the project are.

Budget

One way to quickly build the partnership aspect of your project is to have something financial to contribute to the project. You can not expect to get everything for free but you will find your partners more willing to help if they do not feel like they have been taken advantage of. Show them that you have a budget and are willing and able to pay for some of the services you want them to provide.

Surveys

Use public surveys as a means of learning what your community thinks about your project. Take the time to educate them about your survey process so they will be more willing to cooperate.

Community Project

Public alerting systems should belong to the public. These systems are intended to provide the citizens of your community with information so they will take action to protect themselves and others. It is critical that these people have a sense of ownership in the alerting process so that they will not only tolerate an alert they will expect one.

The community gets behind projects that they understand and can believe in. BEAP did a lot of public education and it paid off in the public acceptance of the project and in the ease with which volunteers came on side. BEAP had assistance from numerous citizens at large who quickly became part of the team. To make this happen you have to accept that people will help as long as they can and as long as it interests them. Have extra people available and have meaningful work for them all.

Public Acceptance

The public demonstrated very good awareness of BEAP and had a positive response to having some form of emergency alerting system. By having the public on side from the beginning it undoubtedly reduced negative feedback. Even those people who were upset by various aspect of BEAP were easily swayed when they spoke with the Project Coordinator and discussed their concerns.

Community Meetings
Attendance at community meetings is very small unless the issue is very contentious. Even then, 50 people would "fill the place to the rafters". This is an old style of getting information to the public and most people see it as too time consuming. A recent hazmat incident or some other calamity would have undoubtedly increased attendance at BEAP public meetings.

BEAP Team
It was necessary, in fact critical, to have BEAP team members educated about the project and as things developed, to keep them up-to-date. Electronic communication with BEAP team members worked reasonably well as long as members would regularly read their e-mail. Not all members had e-mail but good use was made of voice mail where available and pen and paper, where not. E-mail can save a lot of time but the personal communication by phone can address any uncertainty.

Up-to-date
It is imperative that you keep all of your partners up-to-date with the developments of your project. You must recognize that they are extremely busy people and everything that you can do to give them time to work on your project the better for everyone. It is critical to have all information prepared and ready to go as soon as possible. The Media is able to accommodate last minute changes to a certain degree but there is more chance for error the more things are rushed. Once the Media understand what it is you want, they will deliver.

Develop a Unified Program
Your public education program for public alerting should involve several different types of media to get your message across. It is imperative that you have one unified program design so that everything you are doing will easily be recognized as the alerting project. In short you need to brand your project. BEAP linked as many parts of the project as possible and this seemed to provide good results. BEAP was linked by the involvement of B.E.S.T., the siren logo, the colour yellow, using the same voice to narrate radio and TV ads, all newspaper ads used the same design, size and shape, Project Coordinator was the one spokesperson.

Recognizable Voice
Using the Project Coordinator to voice the radio and television commercials worked very well. It helped tie the project together and avoided any hesitation by the media partners in using a voice that may be recognized as a competitor's.

Postal Service
The Postal Service is very effective at getting something to every address in a given area. They are not, however, designed to respond quickly to customer needs. They will not process anything until payment is made and will not take credit cards. They prefer a billing account be established but this takes several weeks to set up. Project Coordinator paid cash to get it delivered on time.

A Good Public Education Campaign Works

Your public education campaign to introduce your siren system and to keep the public aware of its use and purpose is just as important as all of the technical planning you do to implement your siren system. Do not lose sight of the fact that your public education campaign is designed to get and keep your public on your side. Ignore them at your peril.

15. OTHER RELEVANT FINDINGS

Louder Sirens

ATI reported in their recommendations that factors such as wind, barrier effect and ambient noise must be taken into account in designing a complete system. To overcome these factors, ATI's Model HPSS32 maybe considered. The HPSS32 is double the power of the HPSS16. The louder siren will slightly enhance the P.A. due to sound/distance limitations. This will offset obstruction sound attenuation.

A louder siren must also be balanced by the level of noise that the recipient can and will tolerate. The tone cannot be so loud that it hurts or causes bodily harm. It is important to be aware that the public are the end user and for the entire program to work effectively they must be onside.

System Testing

A policy issue that needs to be addressed is the frequency and length of time that the system should be activated in a test to ensure it is functioning. Community input will be involved in determining the parameters of testing. Since this is a community issue and one that is critical to the public's understanding, acceptance and use of the system it is imperative that the public be involved in the process. The policy needs to address:

a. frequency of testing
b. length of test
c. time of day
d. notifying/educating the public about testing
e. criteria for evaluating the test

The frequency of testing needs to be regular enough that people expect and accept it. Many rural communities have a siren that is used to call the volunteer fire department. They are activated on a daily basis for a few seconds at noon. In an urban setting, shift workers need to be considered and noon may or may not be the best time. It may be a better option to test it weekly and operate the siren for one or two minutes in the mid-afternoon. In any case the public should help decide.

The best way to reach a level of testing that is appropriate for the system and the community is to meet with selected members of the community and ask them what they would find acceptable. This allows an opportunity to educate them about the system and its use. It therefore gives them an opportunity to make an informed decision about the system for their community.

Sound Waves

ATI explained that a single frequency has a greater travel distance than a pulsating or

alternating tone. This is due to the effect caused by the continuous push that the sound waves in one similar frequency produce as compared to the on off effect of pulsating tones.

In the second set of tests BEAP has found that cooler temperatures and a lack of foliage have provided better results. We have learned that sound waves bend less in cooler temperatures and therefore will stay closer to the ground for a longer period of time and are more likely to contact the human ear and be heard. The lack of foliage was found to have a significant affect on the test team's ability to hear the siren. Put these two together and BEAP believes that Fall, Winter and early Spring are likely to provide the best conditions for siren sound transmission. Countering this will be the fact that everyone is sealed up tightly in buildings or automobiles to avoid the cold. In emergency preparedness we have to look at the worst case scenario and at least be aware of the problems that they present and make the necessary adjustments to account for them.

Strobe Light

The strobe light was activated during each of the 3 tests. It did not prove effective at alerting people. While the light could be seen from a considerable distance there was nothing about the intensity of the light or the reflectivity off of surfaces that enhanced its attention grabbing ability. Two tests were conducted in the evening, one a full hour after sunset and even then the attention grabbing ability of the strobe was not impressive.

Decision for Brandon

BEAP has been a very community oriented project and any decision on an alerting system in Brandon needs to be made with community input. As a result of BEAP there are now many community volunteers who have some hands on experience with this siren system and will be well positioned to assist in making an informed decision.

Growing Awareness of Need for Alerting

There is growing awareness in Canada and Manitoba in particular of the need for emergency alerting. The Manitoba Government announced in mid-summer that it is looking at various ways to alert the public including putting warnings on TV and radio.