# Global RF Solutions℠

**RF Engineering Consultants**

"Serving The Wireless Industries Needs"

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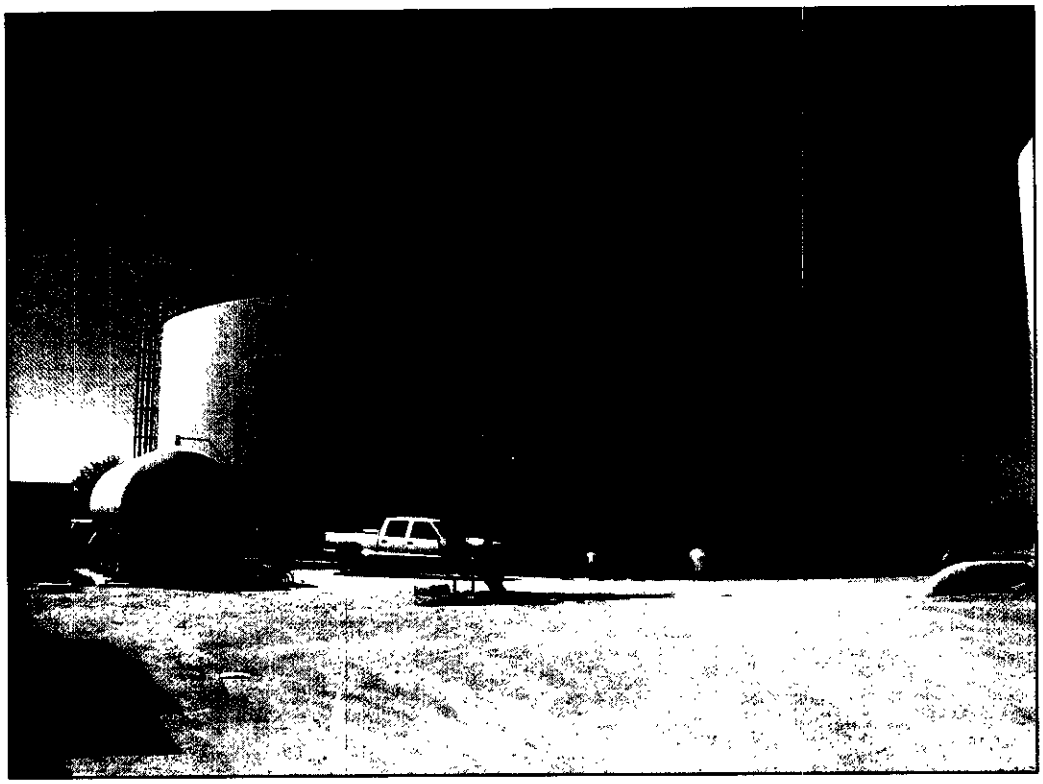
# Evaluation of Human Exposure to Radio Frequency Emissions



## Preliminary Analysis of Maxjo Scottsdale, AZ

# LIMITED WARRANTY

Global RF Solutions warrants that this analysis was performed using substantially the methods that are referenced and described in this report and based entirely upon the information on the antenna site that was provided by Verizon Wireless. Global RF Solutions disclaims all other warranties either expressed or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose.

In no event will Global RF Solutions be liable to you or by any other person for damages, including any loss of profits, lost savings, or other special, exemplary, punitive, incidental or consequential damages arising out of your use or inability to use the analysis whether such claim is based on breach of warranty, contract, tort or other legal theory and regardless of the causes of such loss or damages. In no event shall Global RF Solutions entire liability to you under this Agreement exceed an amount equal to the price paid to for the analysis.

# TABLE OF CONTENTS

# 1. Introduction

A preliminary analysis of this Communications Facility has been completed to determine if it is compliant with guidelines set forth by the Federal Communications Commission (FCC) with regards to maximum human exposure limits.

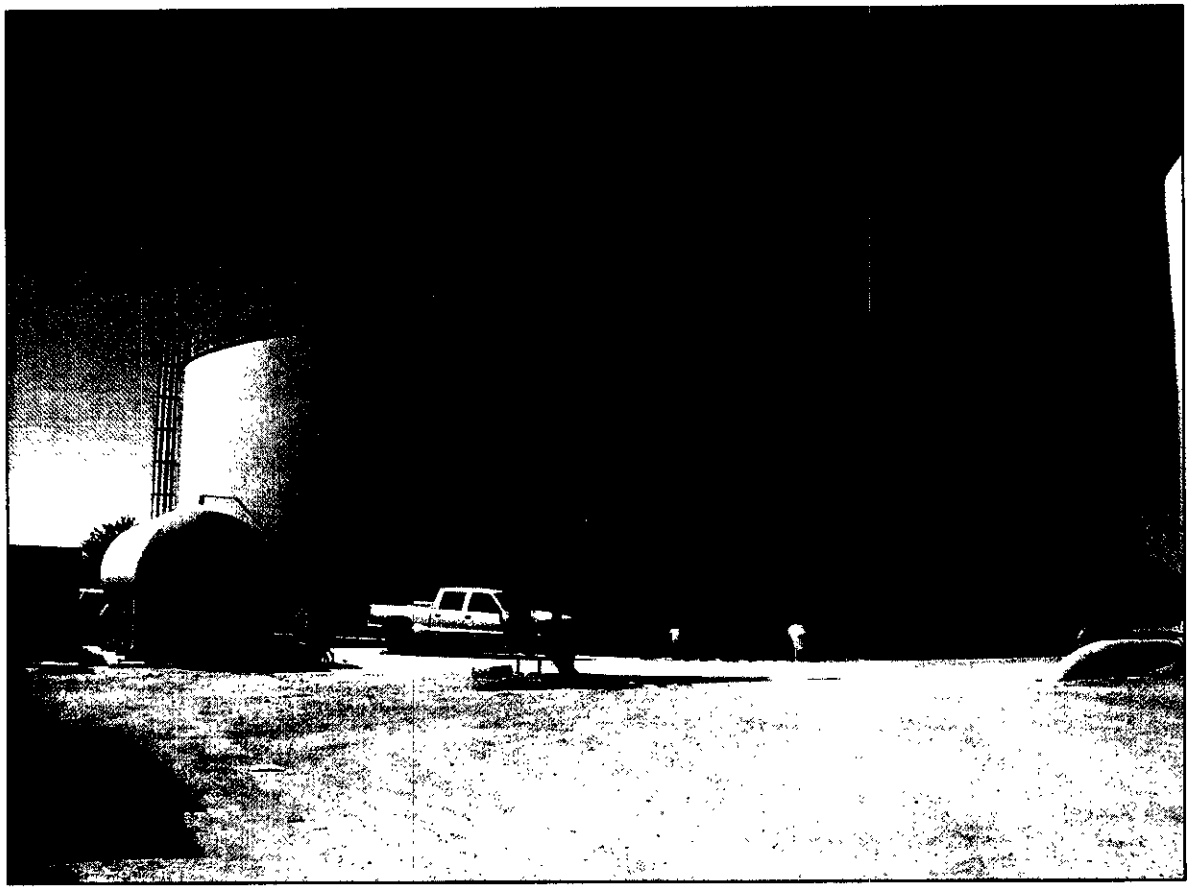
The Radio Frequency Power Density predictions have been done using 100% transmitter duty cycle. This will predict a worst-case scenario for safety reasons. The predictive software tool utilizes a cylindrical model that provides spatially averaged power density that is calculated in one square foot increments (pixels). The composite RF fields are displayed as a percentage of the exposure limit. The software tool utilized for predictive analysis is RoofView®, a product developed by Richard Tell Associates, Inc. The FCC recognizes this software tool as a valid means of determining Maximum Permissible Exposure levels (MPE).

# 2. SITE DESCRIPTION

| | | | | | | |
|---|---|---|---|---|---|---|
| **Site ID: N/A** | | | **Site Name: Maxjo** | | | |
| **Date of Evaluation** | 09/07/04 | | **Site Evaluator (name): Marv Wessel** | | | |
| **Site Type** | **Building** | | **Tower/Monopole** | | **Water Tower** | XX |
| **Address: 26602 N. Pima Rd, Scottsdale AZ** | | | | | | |
| **GPS NAD83** | **N 33 43 45** | | **W 111 53 37.5** | **Structure Height AGL** | | **32'** |
| **Access Restricted** | **Yes** | | | | | |

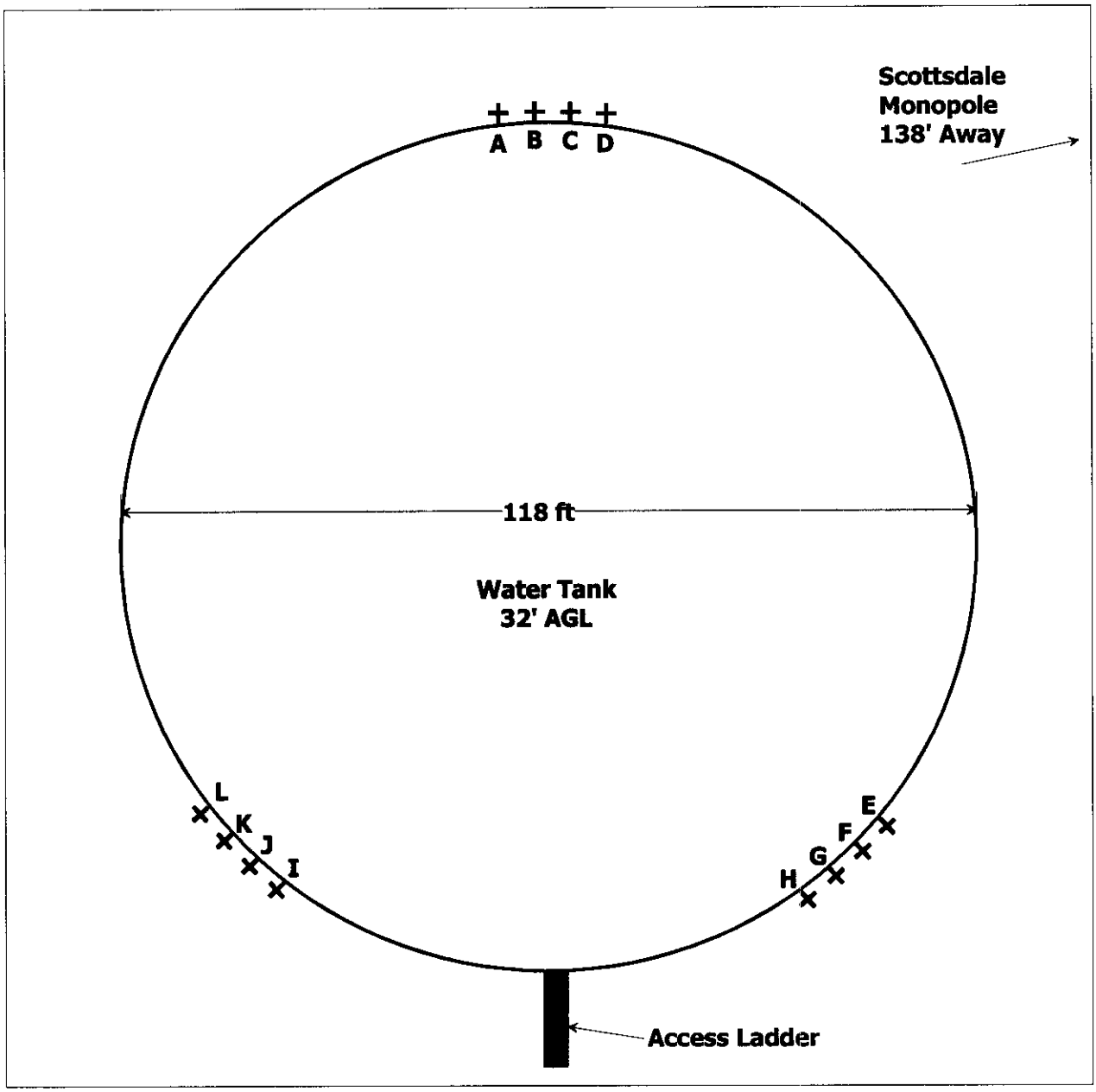
This proposed communications site will be located on the side of an existing water tank. The antennas will be inaccessible to personnel unless special access is provided by man-lift equipment. The Scottsdale water department controls the access to the antennas. The access will be restricted. Access will not be restricted to EME awareness trained personnel and an RF safety plan is not in place.

This is a photograph of the proposed Maxjo site:



# 2. SITE DESCRIPTION (continued)

This drawing depicts the layout of the Maxjo communications facility. The antenna legend is on page 7.



# 2. **SITE DESCRIPTION (continued)**

This is the antenna legend for the drawing on page 6.

| Antenna ID | Owner | Frequency | Antenna Manufacturer | Antenna Model |
|---|---|---|---|---|
| A | Verizon | 885 | CSS | DU06-6060-00 |
| B | Verizon | 885 | Antel | LPA-80063/6C |
| C | Verizon | 1930 | CSS | DU06-6060-00 |
| D | Verizon | 885 | Antel | LPA-80063/6C |
| E | Verizon | 885 | CSS | DU06-6060-00 |
| F | Verizon | 885 | Antel | LPA-80063/6C |
| G | Verizon | 1930 | CSS | DU06-6060-00 |
| H | Verizon | 885 | Antel | LPA-80063/6C |
| I | Verizon | 885 | CSS | DU06-6060-00 |
| J | Verizon | 885 | Antel | LPA-80063/6C |
| K | Verizon | 1930 | CSS | DU06-6060-00 |
| L | Verizon | 885 | Antel | LPA-80063/6C |
| M | City of Scottsdale | 854.9625 | Omni | Omni |
| N | City of Scottsdale | 151.265 | Omni | Omni |
| O | City of Scottsdale | 154.65 | Omni | Omni |
| P | City of Scottsdale | 151.265 | Omni | Omni |
| Q | City of Scottsdale | 151.025 | Omni | Omni |

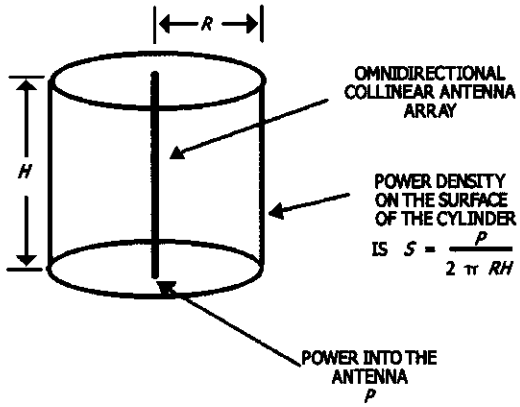
# 3. ANALYSIS

## Site Modeling:

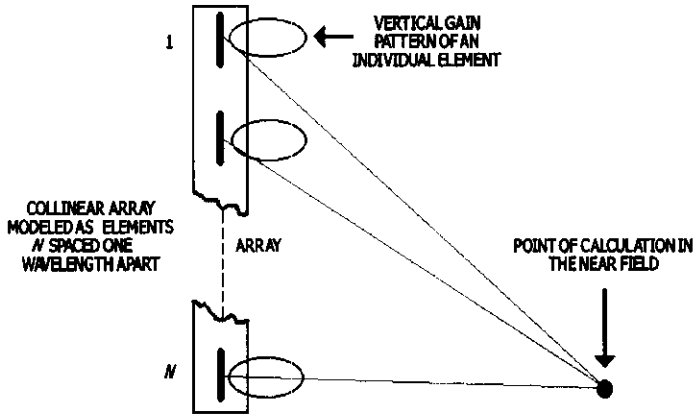
Electromagnetic energy (EME) exposure situations have been modeled at this site by using the following techniques. A cylindrical model in the near field of a vertical collinear antenna is run through a computer calculation engine. This model was used to compute the average power density on the surface of an imaginary cylinder, with a height equal to the antenna's aperture, and a radius equal to the distance of interest.

The collinear antenna model estimates the number of elements in the array and in the gain pattern of each element. The power density in the near field of the antenna is calculated by combining the contributions from each element in the array. The completed calculations of these models are plotted in the RESULTS section. The software tool utilized for predictive analysis is RoofView®, a product of Richard Tell Associates, Inc.

CYLINDRICAL RADIATION MODEL

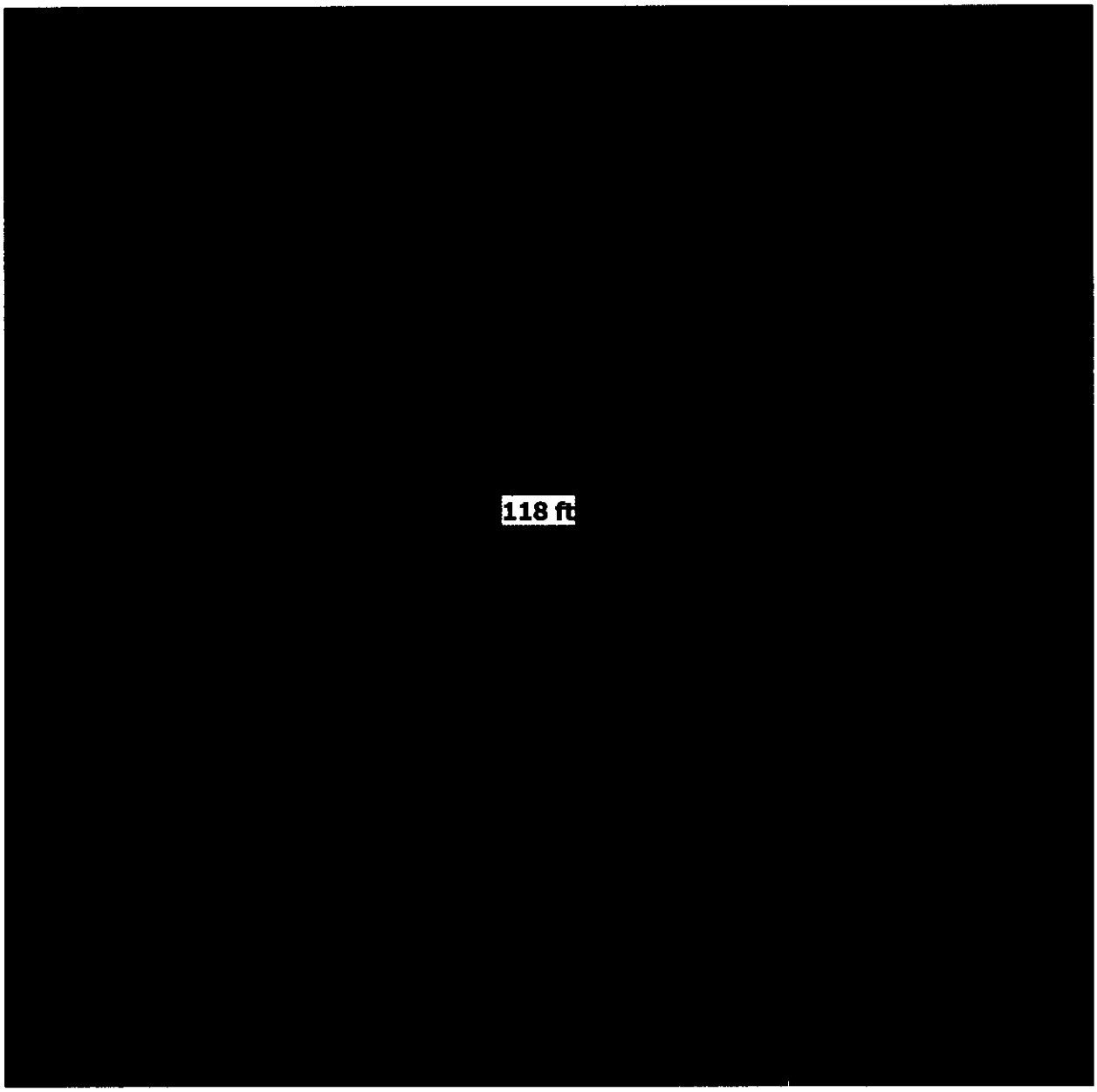



COLLINEAR ARRAY MODEL FOR NEAR FIELD



# 4. RESULTS

This is the predicted software plot using the FCC PUBLIC and FCC OCCUPATIONAL standard. The grid is in 10-foot increments. This shows that the FCC PUBLIC and FCC OCCUPATIONAL MPE limits **cannot be exceeded** at this proposed site.




**FCC OCCUPATIONAL**
**MPE %**
**UPTIME = 100%**

**GREEN**= <20%
**BLUE**= 20% - 100%
**YELLOW**= 100%-1000%
**RED**=>1000%

# 5. CONCLUSIONS AND RECOMMENDATIONS

## Conclusion:

The predicted software analysis has shown that Verizon Wireless **cannot** exceed maximum permissible exposure levels for the FCC Public or FCC Occupational standards at this proposed water tank site. Verizon Wireless has properly designed and configured their equipment to be compliant with FCC guidelines concerning MPE issues. Verizon Wireless **will be compliant** with FCC Guidelines.

## Recommendations:

Verizon Wireless will be compliant with FCC Guidelines at this site as configured. Site access is restricted and controlled. Verizon Wireless is not required to perform additional mitigation procedures.

The use of a "Notice" sign is recommended as well as a "10-Site guidelines" sign. These signs should be posted near the access ladder used to access the water tank.

Landlord **must** ensure that Verizon Wireless antenna access will be restricted to personnel that have been authorized by Verizon Wireless (EME Awareness trained personnel only). This would include all maintenance personnel and contractors accessing the antenna area.

# 6. Engineering Certification

I, Michael Burgett, am registered as a Professional Engineer in the State of Arizona. I am a subcontractor to Global RF Solutions in Chandler, Arizona. It is under this agreement between Global RF Solutions and EDI Electrical Designs, Inc that I provide RF Compliance services to Alltel Cellular, subject to the Federal Communication Commission Maximum Permissible Exposure (MPE) standards as stated in OET65.

I am knowledgeable of the Rules and Regulations of the Federal Communication Commission (FCC) and of the Occupational Safety and Health Administration (OSHA), both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radio-frequency Radiation.

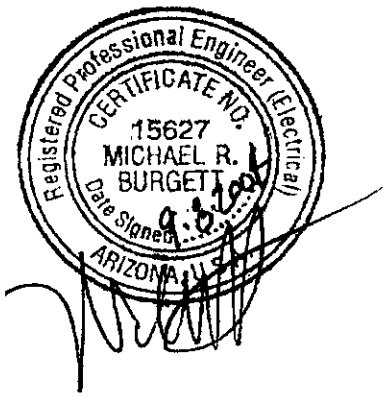
The survey modeling of the water tank environment of the site identified as:

| **Site ID: N/A** | | **Site Name: Maxjo** |
|---|---|---|
| **Date of Evaluation** | 09/07/04 | **Site Evaluator (name): Marv Wessel** |

has been performed in order to determine compliance with the controlled environment and uncontrolled environment Maximum Permissible Exposure levels.

The modeling evaluation was conducted using software (RoofView®) provided by Richard Tell Associates, Inc.

I have reviewed this Site Safety Evaluation and believe it to be true and accurate to the best of my knowledge.




Michael R. Burgett
Registered Professional Engineer
State of Arizona Registration Number 15627
September 8, 2004

# APPENDIX A- LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

*(REFERENCE= TABLE 1. Title 47 CFR)*

**(A) Limits for Occupational/Controlled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) ($mW/cm^2$) | Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842/f | 4.89/f | ($900/f^2$)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | -- | -- | f/300 | 6 |
| 1500-100,000 | -- | -- | 5 | 6 |

**(B) Limits for General Population/Uncontrolled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) ($mW/cm^2$) | Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | ($180/f^2$)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | -- | -- | f/1500 | 30 |
| 1500-100,000 | -- | -- | 1.0 | 30 |

f = frequency in MHz*Plane-wave equivalent power density

NOTE 1: ***Occupational/controlled*** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: ***General population/uncontrolled*** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.