ATTACHMENT 8

Crandlemere and Associates Roof Mounted Transmission Devices
Document Review & Evaluation

R. W. CRANDLEMERE & ASSOCIATES, INC.
PROTECTING BUSINESS AND THE ENVIRONMENT

ROOF-MOUNTED TRANSMISSION DEVICES

DOCUMENT REVIEW AND EVALUATION

TWO WORLD TRADE CENTER

NEW YORK CITY, NY 10081

Project #000095

Merritt & Harris, Inc. #20-251E

User:

Merritt & Harris, Inc.
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Date Issued: November 7, 2000

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The review and evaluation of documents provided regarding the roof mounted transmission devices described herein was conducted by the undersigned, of R. W. Crandlemere & Associates, Inc. (CRANDLEMERE & ASSOCIATES). CRANDLEMERE & ASSOCIATES assessment consisted solely of the activities described in the Introduction of this report. The assessment was conducted in accordance with the Scope of Work described in our Proposal No. 00-090. It is subject to the Limitations and Service Constraints submitted in Appendix A of the ASTM Phase I Environmental Site Assessment provided as part of this Project. See Appendix F of that report for ASTM definitions of words in italics in this report.

Report Prepared by:

R. Wayne Crandlemere
President

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1.0 INTRODUCTION

1.1 Background

R. W. Crandlemere & Associates, Inc. (CRANDLEMERE & ASSOCIATES) was retained by Merritt & Harris, Inc. (the *user*) to conduct an ASTM E1527-97 Phase I *Environmental Site Assessment* (ESA) of One, Two, Four and Five World Trade Center, located in the Borough of Manhattan, New York City, New York, 10081.

It is our understanding that Merritt & Harris, Inc. is providing this information in conjunction with, and as part of, a larger assessment of the *property* and has named The Port Authority of New York and New Jersey as an *additional user* as defined by the ASTM Standard E1527-97 Section 3.3.39. As an *additional user*, The Port Authority of New York and New Jersey may rely on the information presented in this report.

This report presents CRANDLEMERE & ASSOCIATES' professional opinion, and no warranty, expressed or implied, is made. The Port Authority of New York and New Jersey has the right to reproduce in full and provide copies of this report to interested parties. All reports, both verbal and written, are for the benefit of The Port Authority of New York and New Jersey and its' agents, employees, participates, and assigns.

On September 26, 27, 28 and 29 and October 10 and 11, 2000 Mr. R. Wayne Crandlemere of CRANDLEMERE & ASSOCIATES conducted a *Site visit* to identify *recognized environmental conditions* at the Site. In addition, CRANDLEMERE & ASSOCIATES' assessment included reconnaissance of adjacent properties, background research, and review of available local, state and federal regulatory records regarding the presence of petroleum products or hazardous materials at or in the vicinity of the Site.

The results of our work regarding the ASTM Standard for a Phase I Environmental Site Assessment of the Site is provided in a separate Phase I ESA report.

Discussions related to the facility programs that deal with asbestos-containing materials (ACM) and the electro-magnetic radiation related to the antenna tower on One World Trade Center are included in the condition assessment reports related to each building (One, Two, Four & Five World Trade Center), the Retail Mall and Plaza, Central Services and Sub-grade areas.

This report is a discussion of the information specific to Two World Trade Center, the South Tower related only to the roof-mounted transmission devices located on One World Trade Center, the North Tower, and their potential impact on workers and/or visitors at Two World trade Center, the South Tower. See the other specific reports for information specific to those buildings and facility areas.

2.0 REVIEW OF DOCUMENTS

There is a 360 foot tall antenna mast rising from the top of the One World Trade Center Tower extending to a height of 1,728 feet above ground level. The tower and roof have antennas reported to service 9 television stations and 4 FM radio stations, and has an additional 83 wireless communication antennas. As part of this assessment, CRANDLEMERE & ASSOCIATES reviewed the following documents provided by the owner:

- "An Evaluation of the Radiofrequency Environment at the World Trade Center North Tower", September 29, 1997, prepared by Richard Tell Associates, Inc., Las Vegas, NV;

- "Radiation Safety Survey of World Trade Department Ion Mobility Spectrometer Instrument – One World Trade Center" Memorandum March 11, 1998, prepared by Paul W. Mitchell, Environmental and Occupational Health Division, Risk Management, The Port Authority of New York & New Jersey;

- "Antenna Structure Registration", issued 3/23/98, Registration #1002506, U.S. of America, Federal Communications Commission;

- "RF Safety Awareness for World Trade Center Workers, A Presentation at the World Trade Center", dated February 1999 (2/3/99) presented by Richard Tell Associates, Inc. of Las Vegas, NV;

- "Engineering Report Electromagnetic Field Strength Survey at the South Tower of the World Trade Center", March 17, 1999, prepared by Denny & Associates, P.C., Washington, DC;

- "Radiation Safety Survey – One World Trade Center", Memorandum July 26, 1999, prepared by Paul W. Mitchell, Environmental and Occupational Health Division, Risk Management, The Port Authority of New York & New Jersey (copy attached to CRANDLEMERE & ASSOCIATES' report as Appendix A);

- "A Reevaluation of Radiofrequency Fields on the World Trade Center North Tower", September 15, 2999, Revised March 21, 2000, prepared by Richard Tell Associates, Las Vegas, NV;

- "Radiation Safety Survey – One World Trade Center", January 27, 2000, prepared by Paul W. Mitchell, Environmental and Occupational Health Division, Risk Management, The Port Authority of New York & New Jersey;

- "An Investigation of RF Safety Considerations on the World Trade Center Antenna Mast Relevant to Work to Install a New Digital Television Antenna," May 12, 2000, prepared by Richard Tell Associates, Las Vegas, NV; and

- "Radiation Safety Survey – One World Trade Center", July 28, 2000, prepared by Paul W. Mitchell, Environmental and Occupational Health Division, Risk Management, The Port Authority of New York & New Jersey.

The May 12, 2000 Richard Tell Associates (Tell) report indicates "controls are in place to restrict access to the rooftop to personnel who have been trained in radio frequency (RF) safety matters or who are escorted by someone who has been so trained." On the date of CRANDLEMERE & ASSOCIATES roof visit, the access to the roof of One World Trade Center was so restricted and Mr. Crandlemere was so escorted. The Tell report states "special procedures are in place for tower maintenance activities to prevent exposure to RF fields that would exceed the occupational/controlled maximum permissible exposure) MPE limit." Tell's work, as described in their May 12, 2000 report, as well as in their previous work, included "RF field measurements...taken in...designated work region(s) and provides insights and recommendations that will assist in complying with the FCC rules." Appendix C of the May 12, 2000 report includes a Roof Map of RF Fields which indicates only 0.72% (195 square feet) of the roof area potentially exceed FCC RF MPE limits for occupational/ controlled exposures on the roof of the One World Trade Center, the North Tower. They further report "It is important to emphasize that these calculated results are based upon an assumption that all wireless telecommunications antennas on the roof are simultaneously active; that is likely not the case most of the time."

Work performed by Denny & Associates as reported March 17, 1999, indicates that the RF levels measured on the outside observation deck of Two World Trade Center, the South Tower (Photo #1), exceed "the maximum permissible level for general population/ uncontrolled exposure...for certain modes of auxiliary broadcast antenna use at WTC1 (North Tower)." They conclude that "The basic finding of this survey is that only the low band VHF television stations can operate using their auxiliary antennas without causing overexposure of the outdoor observation deck walkway at WTC2." That report indicates "Further investigation of the WTC2 exposure levels is warranted." "Since the initial objective of identifying procedures by which the broadcast stations at WTC1 can employ either their main or auxiliary antennas without exceeding the FCC MPE for general population/uncontrolled environments on the observation deck walkway at WTC2 has not been achieved...additional studies will permit broadcasters at WTC2 to move closer and ultimately fulfill their objectives of assuring compliance with the FCC rules."

3.0 MAJOR FINDINGS AND CONCLUSIONS

Based upon the information reviewed and summarized above, it appears that operational guidelines are currently in place to provide protection for trained workers and trained or escorted visitors to the roof of One World Trade Center, the North Tower, meeting the requirements of FCC MPE limits for occupational/controlled exposures. However, the 1999 Denny & Associates report indicates that under certain conditions the broadcasting at One World Trade Center, North Tower, creates RF exposures on the Two World Trade Center, South Tower, roof-top outdoor observation deck walkway that exceed the FCC MPE limits for general population/uncontrolled exposure. They recommended additional investigation. Based upon these reports, CRANDLEMERE & ASSOCIATES also recommends additional investigation of the RF exposure levels on the roof-top outdoor observation deck walkway on Two World Trade Center, the South Tower, with the intent of identifying procedures under which broadcasts at One World Trade Center, the North Tower, do not create RF exposures exceeding FCC Rules on the Two World Trade Center, South Tower, observation deck.

APPENDIX A

Denny & Associates, P.C.
Consulting Engineers
Washington, D.C.

MARCH 17, 1999

ENGINEERING REPORT
ELECTROMAGNETIC FIELD STRENGTH SURVEY
AT THE SOUTH TOWER OF THE
WORLD TRADE CENTER

EXECUTIVE SUMMARY

Radio-frequency radiation surveys were conducted in December 1998 and January 1999 on the outdoor observation deck walkway of WTC2 (south tower). Previous surveys identified an area on the outdoor observation deck walkway at WTC2 where the maximum permissible level for general population/uncontrolled exposure is exceeded for certain modes of auxiliary broadcast antenna use at WTC1 (north tower). The previous exposure data were obtained with more than one broadcast station on the air, so it was not possible to analyze the aggregate exposure data to determine each broadcast station's individual contribution to the overall exposure level present in the area of concern.

The December measurements were made to identify those television stations able to use their auxiliary antennas at WTC1 without causing overexposure on the outdoor observation deck at WTC2. The basic finding of this survey is that only the low band VHF television stations can

operate using their auxiliary antennas without causing overexposure of the outdoor observation deck walkway at WTC2.

The January measurements were made with one station on the air at a time and individual station exposure data were obtained for each station using its main antenna. For those stations with an auxiliary antenna at WTC1, individual station exposure data also were obtained for that station with its auxiliary antenna in use. The January survey was designed to provide individual exposure data for each station and each mode of station operation. Based on all available information, contributions to the overall RF exposure environment at WTC2 from nonbroadcast sources in the area were expected to be small enough to be ignored and any bias statistically eliminated. However, in the final analysis, contributions from other nonbroadcast sources in the area proved to be too great to be ignored, and the individual broadcast station exposure data was biased by the contribution from nearby nonbroadcast sources. Because of the contributions from nonbroadcast sources, analysis of the January exposure data could not produce the desired result of determining the individual broadcast station contributions to the overall exposure present on WTC2.

Unfortunately, additional surveys will be required to accurately determine the individual broadcast station contributions to the overall exposure present on the outdoor observation deck walkway at WTC2. The next survey to be undertaken should duplicate the December 1998 measurements using new, more accurate instrumentation developed especially for characterizing general population/uncontrolled exposures. Measurements of this type can easily be made with minimal disruption, and the increased accuracy of the instrumentation may allow a conclusion of a slightly less than maximum exposure at WTC2 rather than the present conclusion of a slight overexposure.

If the new instrumentation continues to indicate a slight overexposure on the north side of the outdoor observation deck walkway at WTC2, then the next step will be to define and undertake a survey using instrumentation that will allow the WTC2 exposure to be characterized completely, fully identifying all contributors to the RF energy incident upon the walkway as individual broadcast station, cellular, PCS, paging, community repeater, and so forth. As no off-the-shelf instrumentation is available for this specialized purpose, a measurement system needs to be assembled and tested before this series of measurements can be made.