

**QUALCOMM QCP 2760
SPECIFIC ABSORPTION RATE (SAR)
REPORT**

Prepared By: _____ *Date:* _____

*Dan Laramie
Engineer*

Approved By: _____ *Date:* _____

*Jay Moulton
Director
Regulatory Group*

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1 INTRODUCTION

This test report describes an environmental evaluation measurement of specific absorption rate (SAR) distribution in simulated human head tissues exposed to radio frequency (RF) radiation from a wireless portable device manufactured by QUALCOMM Inc. These measurements were performed for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC). The testing was performed in June 1999 in the QUALCOMM SAR Test Facility. The wireless device is described as follows;

EUT Type: CDMA and Analog Phone
Trade Name: QUALCOMM Inc.
Model: QCP-2760
Tx Frequency : 824.04 – 848.97 and 1851.25 – 1908.75 MHz
Max. Output Power: 27.58 dBm ERP Analog and 25.2 dBm ERP PCS
Modulation: CDMA and Analog
Antenna: Retracting whip w/ helix
Trade Name / Model: QUALCOMM QCP 2760
FCC Classification: Non-Broadcast Transmitter Held to Ear
Application Type: Certification
Serial Number : WKVR
Place of Test: QUALCOMM Inc., San Diego, CA, USA
Date of Test: June 21, 1999
FCC Rule Part: 2.1093; ET Docket 96.326; part 25

2 SAR TEST FACILITY

SAR tests were performed in the Qualcomm SAR Test Facility located at the following address:

Qualcomm Incorporated
 Building AA.
 10290 Campus Point Drive
 San Diego CA 92121-1522

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3 APPLICABLE REGULATIONS

The QCP-2760 is designed to comply with the specific absorption rate SAR limits for distances within 20 cm of the transmitting elements of the MES, and with general public uncontrolled environment Maximum Permissible Exposure (MPE) limits at distances greater than 20 cm from the transmitting elements of the device, as required by Sections 1.1307 through 1.1310, 2.1091 and 2.1093 of the 47 C.F.R. (1997). These FCC RF safety limits, which are based on a hybrid combination of the SAR and MPE requirements from ANSI/IEEE C95.1-1992 and the National Council on Radiation Protection and Measurements (NCRP) report no. 86, are also consistent with the RF safety limits defined in the IRPA Guidelines on Protection Against Non-Ionizing Radiation which are reportedly in the process of being adopted in Europe, as codified in European Pre-Standard ENV 59166-2 approved by CENELEC (1994). This test report pertains specifically to the following limit from the Code of Federal Regulations 47 "Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube)."

4 SAR TEST RESULTS SUMMARY

This device has been tested for localised specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1 ~ 1992 and has been tested in accordance with the measurement procedures specified in ANSI/IEEE Std. C95.3 ~ 1992 . Normal antenna operating positions were incorporated, with the device transmitting at frequencies consistent with normal usage of the device. The device has been shown to be capable of compliance for localised specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE std. C95.1-1992

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5 TECHNICAL DESCRIPTION

The test sample consisted of a QUALCOMM QCP-2760. This model will operate in CDMA PCS and analog cellular mode. The CDMA PCS mode is designed to transmit in the 1851.25 – 1908.75 MHz band at a maximum transmitter output power of 23.1 dBm and a peak antenna gain of 4.1 dBi, or a maximum EIRP of 27.2 dBm. The cellular FM AMPS mode is designed to transmit in the 824.04 – 848.97 MHz band at a maximum output power of 25.5 dBm with a peak antenna gain of 4.1 dBi, or a maximum EIRP or 29.6 dBm. The QCP-2760 is a dual mode and dual band cellular/PCS phone (photo 1 & 2). The antenna is a standard retracting whip antenna tuned for dual frequency, with a helix antenna that is at the base of the whip which gets activated when the whip is retracted. Since either position is possible during use, both retracted and extended were tested, at the bottom, middle, and top frequencies of each band.

5.1 DESCRIPTION OF QUALCOMM SAR TEST FACILITY

All tests were performed under the following environmental conditions:

Temperature Range:	15 - 35 Degrees C	(Actual 20 C)
Humidity Range:	25 - 75 %	(Actual 38 %)
Pressure:	860 - 1060 mbar	(Actual 1015 mB)

The SAR tests were performed using the following facilities :

All Qualcomm dosimetry equipment is operated within a shielded screen room manufactured by Lindgren RF Enclosures to provide isolation from external EM fields. The E-field probes of the DASY 3 system are capable of detecting signals as low as 5µW/g in the liquid dielectric, and so external fields are minimised by the screen room, leaving the phone as the dominate radiation source. The floor of the screen room is reflective, so four two-foot square ferrite panels are placed beneath the phantom area of the DASY system to minimise reflected energy that would otherwise re-enter the phantom and combine constructively or

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destructively with the desired fields. These ferrite panels provide roughly 12 to 13 dB of attenuation in the frequency range of 900 MHz, and 7 to 8 dB of attenuation in the frequency range of 1.9 GHz. Space beneath the DASY system limits the absorber type to ferrite tiles, although this attenuation combined with scattering of the energy is sufficient to bring the system validation within the acceptable tolerance.

DOSIMETRY SYSTEM The dosimetry equipment consists of a complete DASY3 V1.0 dosimetry system manufactured and calibrated by Schmid & Partner Engineering AG of Zurich, Switzerland, it is currently a state of the art system and from our research, it appears to be the best available at this time. The DASY3 system consists of a six axis robot, a robot controller, a teach pendant, automation software on a Pentium 200 MHz computer, data acquisition system, isotropic e-field probe, and validation kit.

E-FIELD PROBE This test was performed using an E-field probe with conversion factors determined by Schmid & Partner (S & P). The probe is the most important part of the system, so will be discussed in section 5.2.

PHANTOM The phantom was the so called "generic phantom" supplied by S & P, and consists of a left and right side head for simulating phone usage on both sides of the head. The phantom is constructed of fibreglass with 2 +/- 0.1 mm shell thickness. The shape of the shell is based on data from an anatomical study of a group of 33 men and 19 women to determine the maximum exposure in approximately 90% of all users. The DASY system uses a homogeneous tissue phantom based on studies concerning energy absorption of the human head, and the different absorption rates between adults and children. These studies indicated that a homogeneous phantom should overestimate SAR by no more than 15% for 1 g averages and should not underestimate SAR. In similar studies it was found that a typical ear thickness is approximately 4 mm, so a 4 mm rubber ring is attached to the phantom at the ear area.

LIQUID DIELECTRIC The tissue simulating liquid which fills the phantom is supplied by QUALCOMM. There are two separate formulas for the two frequencies 900 MHz and 1800 MHz. This is necessary because the water molecules raise the conductivity to approximately 1.65 +/- 10% at the 1800 MHz frequency, without the addition of salt, so no salt is needed. Before the test the permitivity and conductivity were measured with an automated Hewlett Packard 85070B dielectric probe in conjunction with an HP 8752C network analyser to monitor permitivity change due to evaporation. The electromagnetic parameters of the liquid were maintained as shown in table 1. The target values were obtained from the FCC web page for Tissue Dielectric Properties with internet address

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www.fcc.gov/fcc-bin/dielec.sh . The 1800 MHz liquid prepared has no salt or any conductive additive (the chemical/physical properties of the water, preservative, and sugar molecules alone provide too much conductivity) it is impossible to lower the conductivity to 1.15 S/m without a new formula with different ingredients. In other words we would have to locate an ingredient to replace the sugar/water/preservative ingredients with materials providing similar density, permitivity, and optical properties (for the optical surface detection) but having lower conductivity at 1800 MHz. It was determined that using the 1800 MHz fluid from Schmid & Partner would overestimate the SAR by a small margin, and maintain maximum confidence.

FREQUENCY	PERMITIVITY	CONDUCTIVITY	DENSITY
900 MHz	41.8 +/- 5%	.82 +/- 10% mho/m	1 g/cm ³
1800 MHz	42.3 +/- 5%	1.62 +/- 10% mho/m	1 g/cm ³

Table 1

Schmid & Partner has supplied us with data that can be used to show the error in SAR caused by using higher conductivity. In general higher conductivity, *over estimates* measured SAR values. So by using a higher conductivity in the 1800 MHz band we were measuring SAR values higher than would exist in the human brain. This data is provided here in Table 2.

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<i>Distance of radiator from liquid surface</i>	<i>Frequency MHz</i>	<i>Avg. volume gram</i>	<i>Increase of SAR per Increase in conductivity</i>	<i>Relative. permittivity</i>	<i>Conductivity of liquid S/m</i>	<i>Density of liquid g/cm³</i>
10 mm	900	1	+ 0 .62	41.5	0.85	1
10 mm	900	10	+ 0.39	41.5	0.85	1
15 mm	900	1	+ 0.63	41.5	0.85	1
15 mm	900	10	+ 0.39	41.5	0.85	1
30 mm	900	1	+0.63	41.5	0.85	1
30 mm	900	10	+0.39	41.5	0.85	1
10 mm	1500	1	+ 0.55	40.5	1.2	1
10 mm	1500	10	+ 0.27	40.5	1.2	1
15 mm	1500	1	+ 0.55	40.5	1.2	1
15 mm	1500	10	+ 0.27	40.5	1.2	1
30 mm	1500	1	+ 0.54	40.5	1.2	1
30 mm	1500	10	+ 0.26	40.5	1.2	1
10 mm	1800	1	+ 0.43	40.0	1.65	1
10 mm	1800	10	+ 0.13	40.0	1.65	1
15 mm	1800	1	+0. 42	40.0	1.65	1
15 mm	1800	10	+ 0.13	40.0	1.65	1
30 mm	1800	1	+ 0.41	40.0	1.65	1
30 mm	1800	10	+ 0.12	40.0	1.65	1

Table 2

The E-field probe is calibrated by the manufacturer in brain simulating tissue at frequencies of 900 MHz, and 1.8 GHz, accurate to +/- 8%. Linearity is said by the manufacturer to be +/- .2 dB from 30 MHz to 3 GHz. Dynamic range is said by the manufacturer to be 5 μW/gm to > 100 mW/g. The probe contains 3 small dipoles positioned symmetrically on a triangular

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core to provide for isotropic detection of the field. Each dipole contains a diode at the feed point that converts the RF signal to DC, which is conducted down a high impedance line to the data acquisition system.

The data acquisition system amplifies the signals, and converts them to digital values so that they may be sent to the computer. The inputs to the signal amplifiers are auto zeroed after every measurement to prevent charge build up on the lines, which could lead to errors.

5.2 SAR SYSTEM THEORY

The human body absorbs energy from a radiating cell phone by ionic motion and oscillation of polar molecules. The human head is in the near field of the device where polarisation and field intensity are very complex. Also the human head can cause large reflections and scattering, so it is more practical to measure the field absorbed inside the head, than to measure incident power before it enters the head. Inside the lossy brain tissue, the power per unit volume is given by (next page):

$$\mathbf{R} = 1/2 \mathbf{J} \cdot \mathbf{E}^* = 1/2 \mathbf{s} |\mathbf{E}|^2 \quad \text{W/m}^3$$

where \mathbf{J} is current density

\mathbf{s} is conductivity of human tissue due to conductive and lossy displacement currents.

\mathbf{E} is the electric field

But since SAR is the absorption of RF power per unit mass

$$\mathbf{R}_g = 1/2 \mathbf{s}/\rho |\mathbf{E}|^2 \text{W/kg}$$

where ρ is density of the tissue in kilograms per cubic meter.

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In this equation, σ is a function of frequency, and so it must be measured at the frequency of the test. It is measured in terms of the real and imaginary components of the complex permittivity;

$$\epsilon = \epsilon_0 (\epsilon' - j\epsilon'')$$

$$\sigma = 2\pi f \times (8.854 \times 10^{-12}) \times \epsilon''$$

$$\text{Loss Tangent} \equiv \tan \delta = \epsilon'' / \epsilon'$$

In order to measure the E field strength without distorting the field, the E field probe (shown here) is made as described by Schmid, Egger, and Kuster in [3].



E-field Probe

A major concern is that secondary coupling of the EUT radiated fields to the feed lines of the probe are minimised. This is done by making the feed lines of high impedance “twin-line” transmission line, printed very close together. In the probe tip there are three orthogonal dipoles, electrically small to minimise field distortion from coupling. The electrically small dipoles have source impedance’s of 5 to 8 M Ω due to their small size, the high resistive feed lines, and the distributed filters on the lines. This high impedance makes them less sensitive so a sophisticated Data Acquisition Electronics (DAE) box is needed to amplify, multiplex, and digitize the signals. The DAE is installed on top of the robot arm. It also detects the proximity of the phantom surface with a fiber-optic cable. It provides for multiplexing between the three dipoles, and between 1X gain and 100X amplification, and it provides some filtering that will remove unwanted signals picked up by the probe. The DAE also provides a fast digital link to the robot for stopping in the event of a touch detection. It samples the probe output for 2600 complete E field measurements per dipole, per second. These samples are used to determine the amplification needed, 1X or 100X, and the magnitude determines what diode compression correction factor should be used. These factors as well as

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sensitivity factors of the specific probe, which are stored in the program, are used to determine the actual field strength for the test point.

The substrate on which the dipoles are printed, has been shaped to align each dipole with the E-field *after* the field lines are distorted by the permittivity of the substrate. In other words, since the substrate and the liquid dielectric have differing permittivities, the E-field will diffract as it passes through the interface, and so the dipoles have been positioned to align with the fields *after* this distortion is accounted for.

The dipole elements in the probe are offset from the tip of the probe approximately 2.7 mm so unfortunately the field strength cannot be measured at the surface of the phantom, where it is likely to be maximum. The magnitude of the field at the surface must therefore be calculated with interpolation by using the data points stepped away from the surface and curve fitting, this is done automatically by the software .

6 TEST SAMPLE OPERATION

The wireless device was made to transmit maximum power that is allowed by the software in the device. A Tektronics CMD-80 was used to force the device to transmit maximum power for the duration of the SAR tests. The DASY 3 system checks E field strength at a fixed location before and after each scan, and checks for drift due to draining of the battery or some other effect. This shows up as "drift" on the report and if it is too high the test is repeated.

7 CALIBRATION DATES OF TEST EQUIPMENT

All measurements were made with instruments whose operation and accuracy has been verified by a Calibration Laboratory with traceability to National standards. The calibration dates for each measurement instrument is shown in the following table.

<u>EQUIPMENT MANUFACTURER & TYPE</u>	<u>SERIAL NO.</u>	<u>LAST CAL.</u>	<u>NEXT CAL.</u>
Schmid & Partner Engineering AG Dosimetric E-field Probe:ET3DV5	1335	Jan 14, 1999	Jan, 2000

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Schmid & Partner Engineering AG dipole	220	Jan, 1998	Jan, 2000
Schmid & Partner Engineering AG dipole validation kit : type D900V2	024	Jan, 1998	Jan, 2000
Schmid & Partner Engineering AG Data Acquisition Electronics : Model DAE3 V1	335	June 6, 1998	June 6, 2000
HP ESG-D3000A Digital Sig Gen		Aug 3, 1998	Aug 3 1999
HP 437B RF Power Meter		April 17, 1999	April 17, 2000
HP Vector Network Analyzer		Oct 10, 1998	Oct 10, 1999
HP 85070M Dielectric Probe System		Not Required	
Liquid Dielectric for 900, 1800 MHz		Replaced every 3 months	

SAR SYSTEM SPECIFICATIONS

Data Acquisition

Processor: Pentium 200 MHz
Operating Sys: Windows

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Software: DASY3 V1.0b Dec 97 edition, Schmid & Partners Eng. AG, Switzerland
Amplifier Gain: 10X or 100X depending on signal level
Surface Detection: Optical and Mechanical
Sample Rate: 7800 data sets per second
Isolation: Fiber Optics to computer, 100K Ω /□ to probe tip

E-Field Probe

Offset tip to sensor center: 2.7 mm
Offset surface to probe tip: 1.8 +/- 0.2
Frequency: 30 MHz to 3.0 GHz
Dynamic Range: 5 μ W/g to 100 mW/g
Isotropy: +/- .15 dB (in brain liquid)

Phantom

Dielectric: Homogeneous sugar/salt/cellulose liquid
Shell: 2 mm +/- 0.2 mm polyester fiber glass
Ear: 4 mm rubber ring

Liquid Dielectric

Permittivity: 41.8 @ 900 MHz, 42.3 @ 1800 MHz
Conductivity: .82 S/m @ 900 MHz, 1.62 S/m @ 1800 MHz

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13 SAR MEASUREMENT PROCEDURE

DEVICE POSITIONING The phone was tested in the primary test position that is described by Supplement C of OET Bulletin 65 from the Office of Engineering & Technology, of the FCC. The procedure places the surface of the phone in contact with the phantom.

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14 SAR MEASUREMENT UNCERTAINTY

The possible errors included in this measurement arise from device positioning uncertainty, device manufacturing uncertainty, liquid dielectric permittivity uncertainty, liquid dielectric conductivity uncertainty, uncertainty due to disturbance of the fields by the probe.

These will be discussed as they are of much importance to the final dosimetric assessment. Every attempt is made to reduce uncertainty, as well as to test for worst case SAR. These uncertainties are likely to be pessimistic, but they should be considered when comparing data taken from one lab to another. Thomas Schmid of Schmid and Partners has performed a study of SAR repeatability due to many different uncertainties, this is likely the most complete study of the topic so it is referred to here.

Device positioning; this uncertainty is due to different operators positioning the device on the phantom differently, it depends on the operators, the device design, the phantom, and the device holder. Repeatability for some devices in Schmid's study was as poor as +/- 30% for the "touch" position. For the "intended use" position the repeatability was approximately +/- 5%, depending on the device tested, overall a figure of +/- 6% was taken as typical device positioning uncertainty. One operator is used at the QUALCOMM lab, trained to place the phone as close as possible to phantom, and the test is performed after the position of maximum SAR is determined. This minimises device positioning error. Typically the phone is clamped in the holder in the horizontal position, and a short wooden dowel is placed in a small hole where the center of the ear speaker resides, this wooden dowel allows the operator to line up the speaker with the ear canal. Once aligned, the tooth pick is removed, and the phone is raised up until it touches the phantom on the ear. Then the cradle is rocked so the phone rocks toward the chin of the phantom, touching as closely as possible without depressing the keypad. This puts the phone as close as possible to the phantom, allowing maximum SAR to be measured, for most positions. In the event that this may not produce maximum SAR, the phone is placed in several other positions and a coarse scan is run for each position. The DASY system has a command called "move to max" which allows the probe to be sent to the point of max field intensity found with the coarse scan. This gives a visual indication of where the maximum surface currents may be, and allows the operator to position this point of the phone as close as possible to the phantom.

Liquid dielectric permittivity and conductivity; The average permittivity of a typical human head was determined by Dr. Gabriel and has been listed by the FCC (OET bulletin 65 supplement C) as 46.1 at 835 MHz and 43.4 at 1800 MHz. The lower permittivity generally

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gives a slightly higher SAR value, so slightly lower values were used for the test. Since SAR is defined as the time rate of absorption per unit of weight, only the macroscopic simulation of the tissue's permittivity, permeability, and conductivity are required. These electrical properties are obtained with a liquid which uses sugar to raise the permittivity, salt to raise the conductivity, and cellulose to hold the two in suspension. After installing the liquid it is measured with an HP 85070A dielectric probe kit. The achievable accuracy of this device is +/- 5% for the permittivity and +/- 10% for the conductivity. The liquid is also measured at the beginning of each SAR measurement day, to check for evaporation.

FIELD DISTURBANCES Errors due to disturbance of the fields by the probe; because the polarisation of the fields are unknown, the near field probe must measure all polarisation's without disturbing them by being present. Three orthogonal dipoles are located at the tip of a special dielectric support, with diodes at the feed points sensitive to fields as small as 5 microWatt/gm. To prevent secondary coupling of the fields to the feed lines, the lines are high resistance printed lines with distributed filters integrated in the lines, after the diode. Much research has been put into these probe designs, so their uncertainty is considered minimized. There are other uncertainties, such as laboratory setup uncertainty, the reader should refer to attachment 10 of the March 1998 minutes of the IEEE standards coordinating committee, by Thomas Schmid. Mr. Schmid's preliminary uncertainty figure is -12% to +52% for the SAR measurement. As stated before this is possible, but believed to be pessimistic because many of the sources of uncertainty have been reduced or eliminated, at considerable expense. All practical precautionary measures are taken to reduce these errors in the QUALCOMM Inc. SAR lab.

Surface Detection The surface detection on the DASY system is mechanical and optical, it is checked and compared automatically to ensure correct operation. This can indicate that the optical surface detection is not in agreement with the mechanical, which might mean the liquid needs to be stirred. This process insures minimum distance from the surface of the phantom for measurements.

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15 TEST DATA SUMMARY

The device which was tested is the final production model in both the analogue and digital modes. The SAR values measured indicate that the device produces SAR levels below the limit of 1.6 mW/g for the one gram average.

Ambient TEMPERATURE (°C) 20 C

Relative HUMIDITY 38%

Atmospheric PRESSURE 1015 mB

Mixture Type: Water/Sugar/cellulose/Salt

Dielectric Constant: 41.8

Conductivity: .82 +/- 10% mho/m

Closest Distance between E-Probe & Phone Antenna 22 mm (intended use position)

ANSI/IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak (Brain) Uncontrolled Exposure/General Population	1.6 W/kg (mW/g)
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FREQ. MHZ	SERIAL NUMBER	HEAD SIDE	MODULATION	ANTENNA POSITION	1 GRAM AVG. SAR (MW/G)
824	WKVR	L	ANALOG	Ext	.64
824	WKVR	L	ANALOG	Ret	1.33
836.5	WKVR	L	ANALOG	Ext	.725
836.5	WKVR	L	ANALOG	Ret	.965
849	WKVR	L	ANALOG	Ext	.790
849	WKVR	L	ANALOG	Ret	.989
824	WKVR	R	ANALOG	Ext	.58
824	WKVR	R	ANALOG	Ret	1.28
836.5	WKVR	R	ANALOG	Ext	.76
836.5	WKVR	R	ANALOG	Ret	.97
849	WKVR	R	ANALOG	Ext	.85
849	WKVR	R	ANALOG	Ret	1.01
1853.75	WKVR	L	CDMA	Ext	1.12
1853.75	WKVR	L	CDMA	Ret	1.13
1880	WKVR	L	CDMA	Ext	1.15
1880	WKVR	L	CDMA	Ret	1.15
1908.75	WKVR	L	CDMA	Ext	.94
1908.75	WKVR	L	CDMA	Ret	.92

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FREQ. MHZ	SERIAL NUMBER	HEAD SIDE	MODULATION	ANTENNA POSITION	1 GRAM AVG. SAR (MW/G)
1853.75	WKVR	R	CDMA	Ext	1.03
1853.75	WKVR	R	CDMA	Ret	.99
1880	WKVR	R	CDMA	Ext	.89
1880	WKVR	R	CDMA	Ret	.87
1908.75	WKVR	R	CDMA	Ext	.76
1908.75	WKVR	R	CDMA	Ret	.74

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- [3] Thomas Schmid, Oliver Egger, Niels Kuster "Automated E-Field Scanning System for Dosimetric Assessments" IEEE Transactions on Microwave Theory and Techniques, Vol 44, No 1, January 1996
- [4] Niels Kuster, Q. Balzano, and J.C. Lin "Mobile Communications Safety" Chapman & Hall, First edition 1997

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QCP 2760 #Wkvr 6-18-99, LEFT HEAD, 25.53dBm CONDUCTED, CHANNEL 991

SAR (1g): 0.642 [mW/g] ± 0.18 dB, SAR (10g): 0.496 [mW/g] ± 0.23 dB

Cubes (2) (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

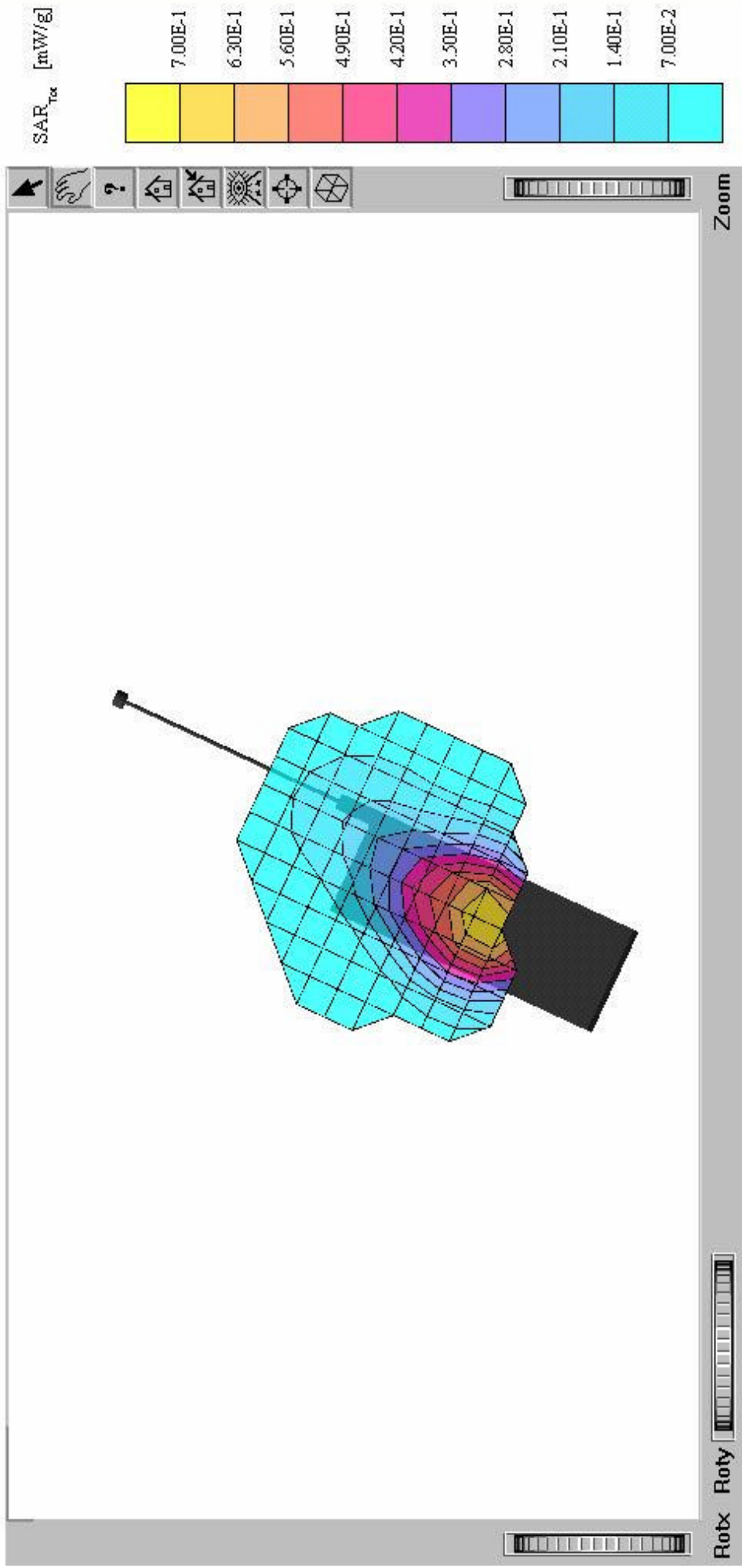
Generic Twin Phantom; Left Hand Section

Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)

Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.04 dB

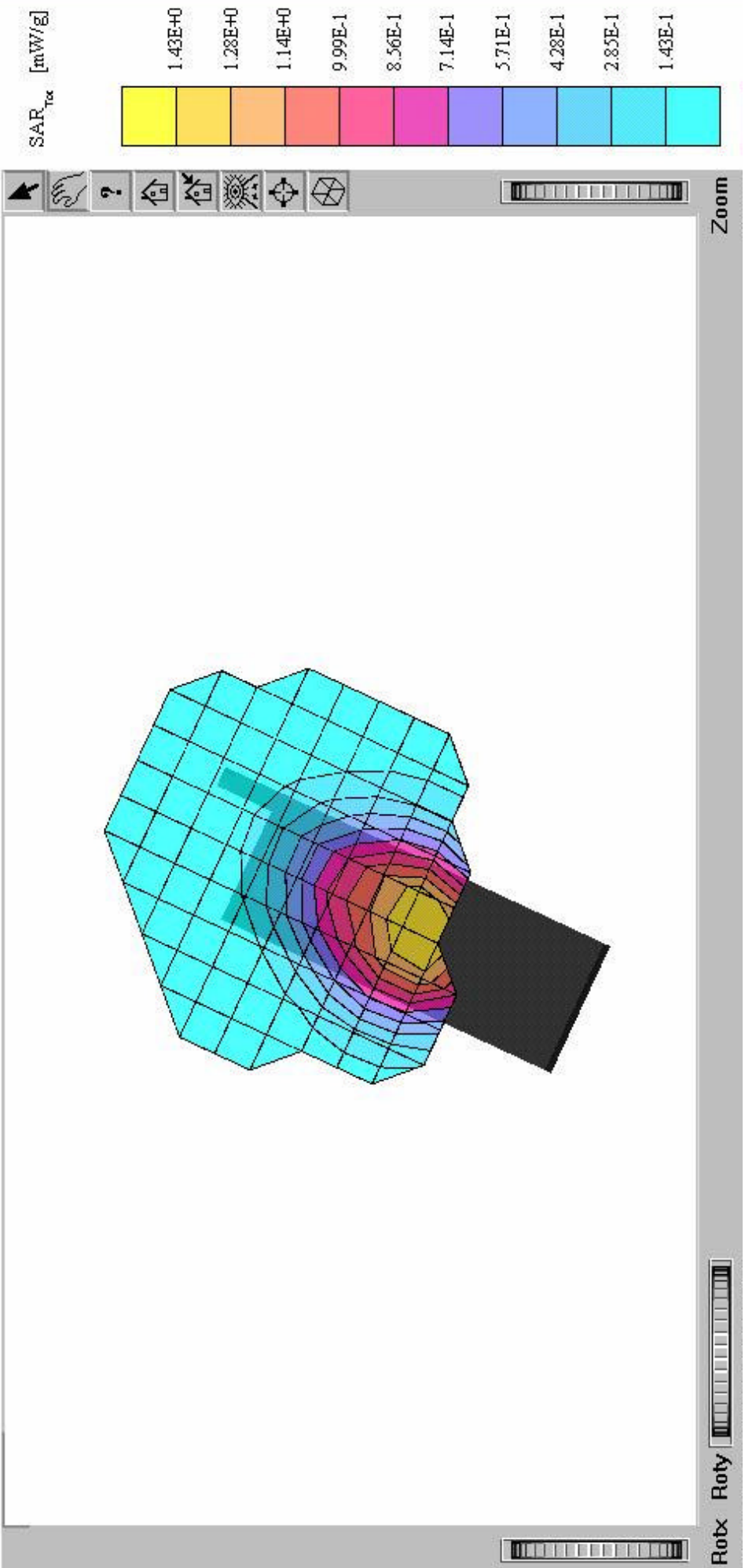
File Name: QCP-2760 6-18-99 #5.DA3

Operator: DWS



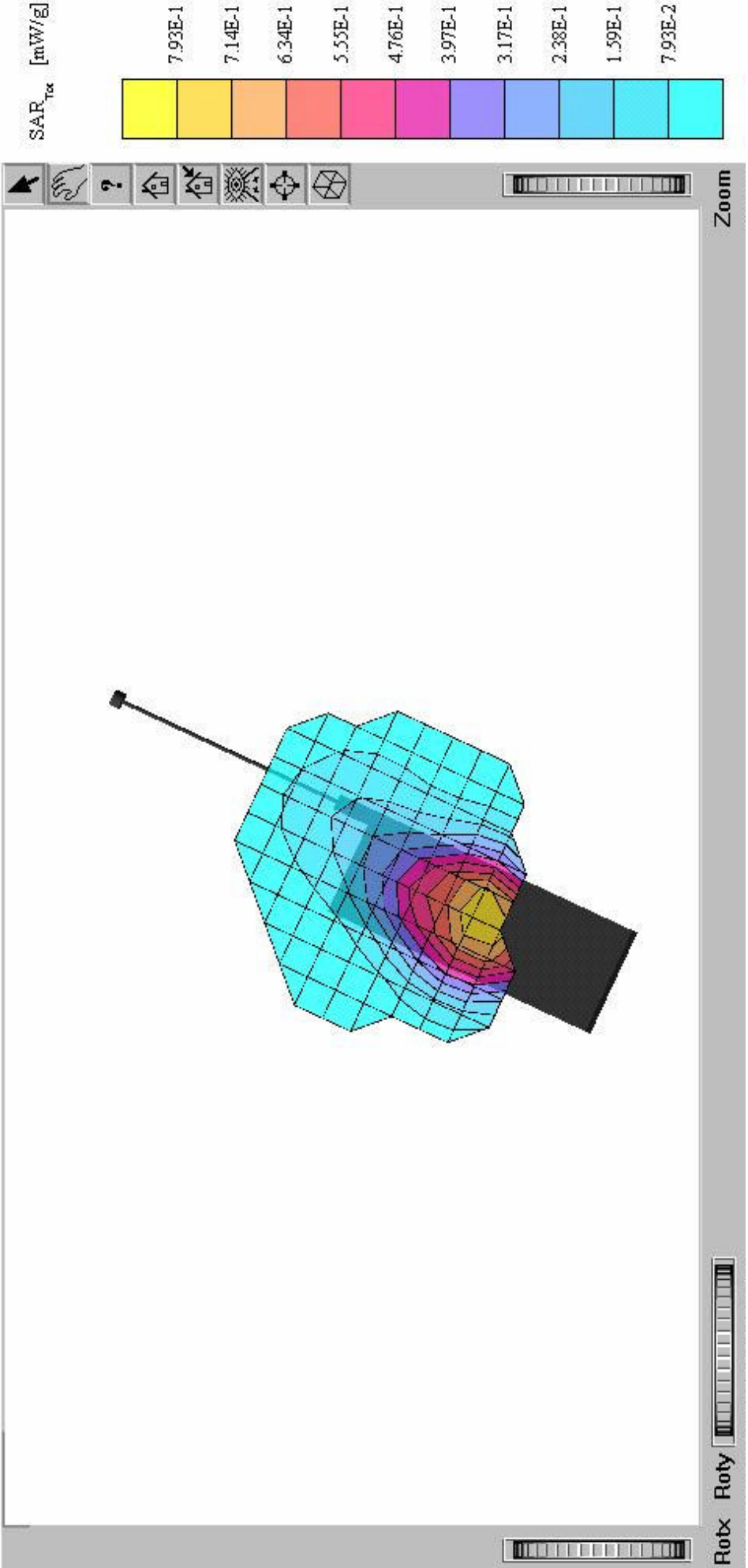
QCP 2760 #Wkvr 6-18-99, LEFT HEAD, 25.53dBm CONDUCTED, CHANNEL 991

SAR(1g): 1.33 [mW/g] ± 0.20 dB, SAR(10g): 1.04 [mW/g] ± 0.20 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.23 dB
File Name: QCP 2760 6-18-99 #4.DA3
Operator: DWS



QCP 2760 #WKVR 6-18-99, LEFT HEAD, 25.37dBm CONDUCTED, CHANNEL 383

SAR (1g): 0.725 [mW/g] ± 0.15 dB, SAR (10g): 0.561 [mW/g] ± 0.17 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.48 dB
File Name: QCP 2760 6-18-99 #6.DA3
Operator: DWS



QCP 2760 #WKVR 6-18-99, LEFT HEAD, 25.37dBm CONDUCTED, CHANNEL 383

SAR (1g): 0.966 [mW/g] ± 0.21 dB, SAR (10g): 0.745 [mW/g] ± 0.19 dB

Cubes (2) (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

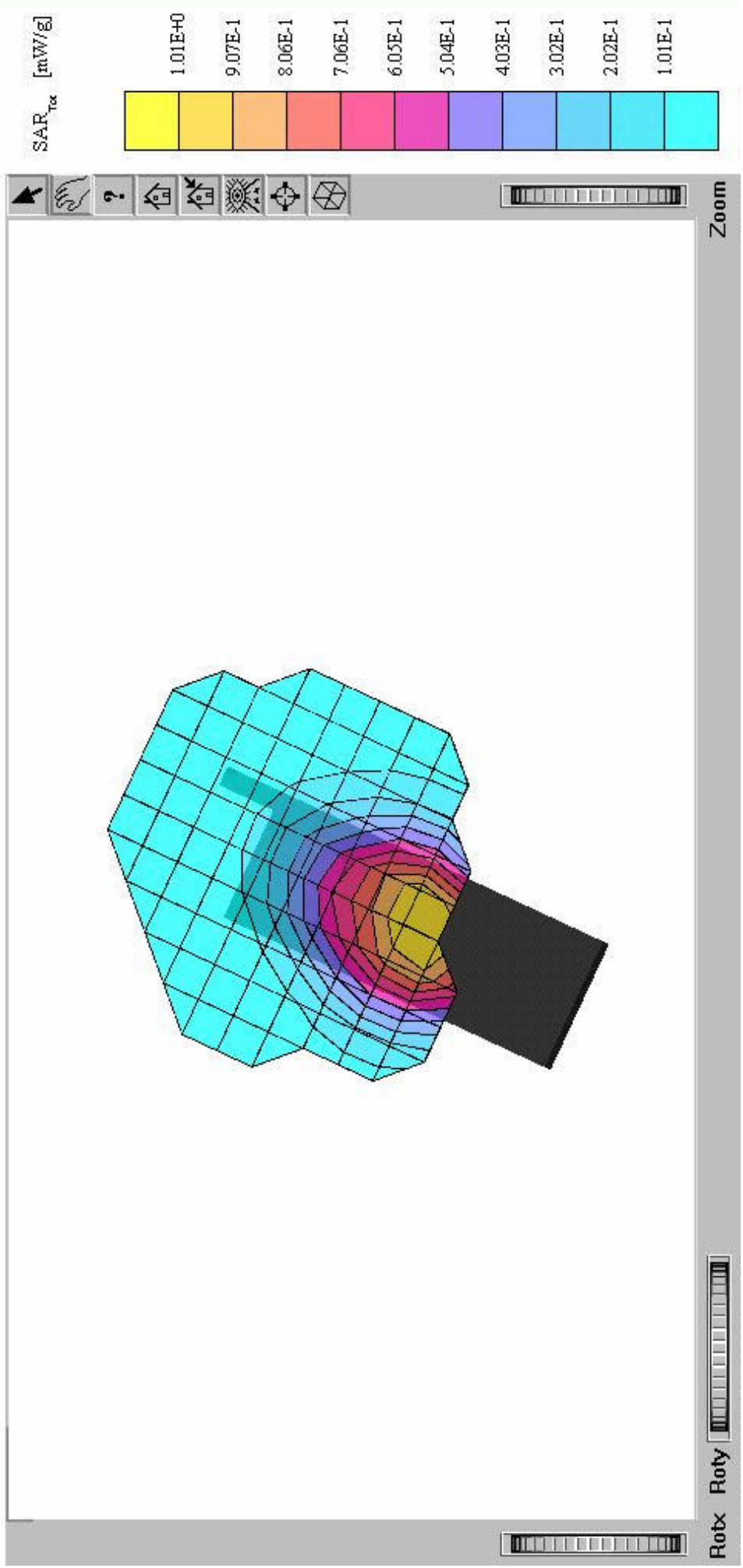
Generic Twin Phantom; Left Hand Section

Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)

Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.12 dB

File Name: QCP-2760 6-18-99 #7.DA3

Operator: DWS



QCP 2760 #WKVR 6-18-99, LEFT HEAD, 25.55dBm CONDUCTED, CHANNEL 799

SAR (1g): 0.791 [mW/g] ± 0.21 dB, SAR (10g): 0.612 [mW/g] ± 0.21 dB

Cubes (2) (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

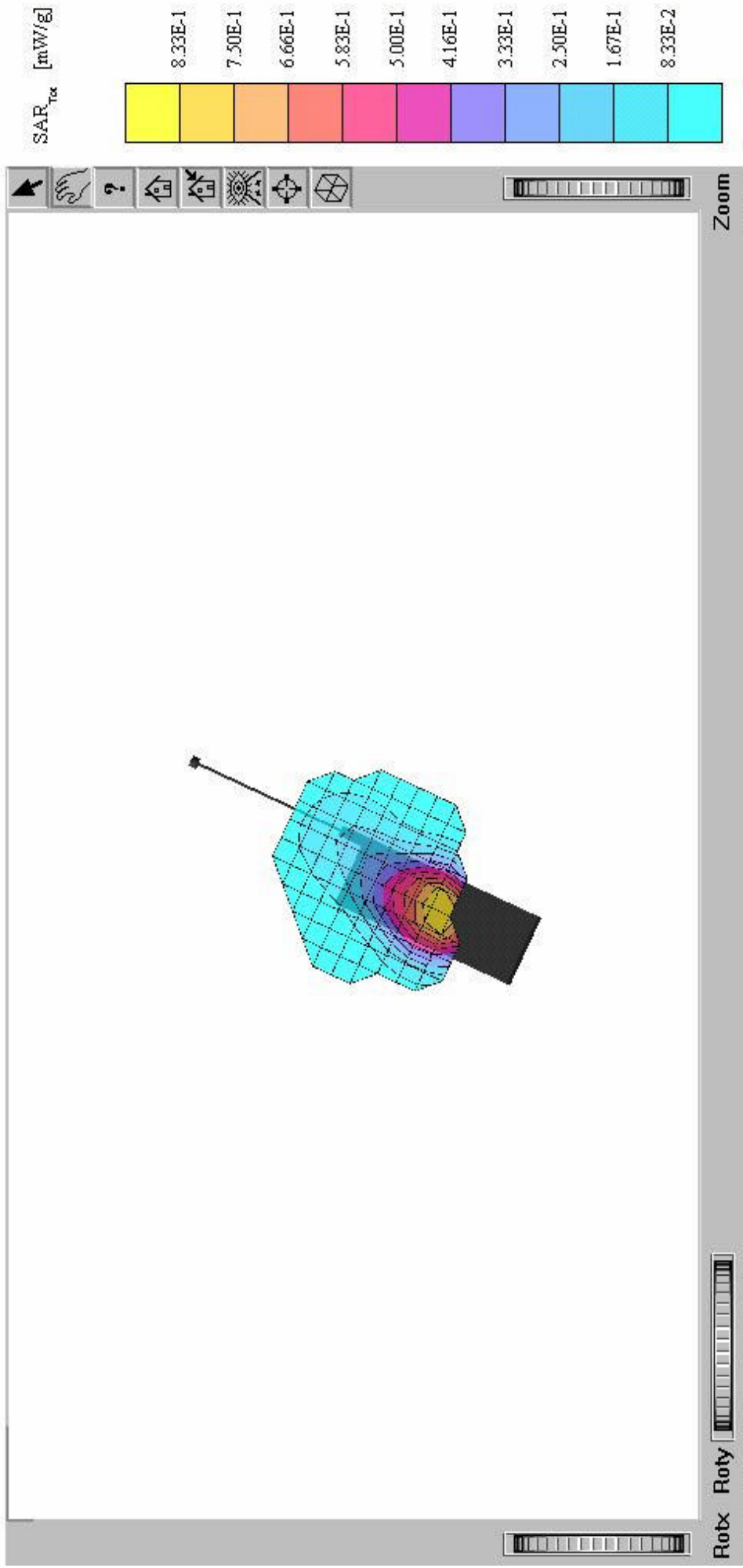
Generic Twin Phantom; Left Hand Section

Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)

Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.03 dB

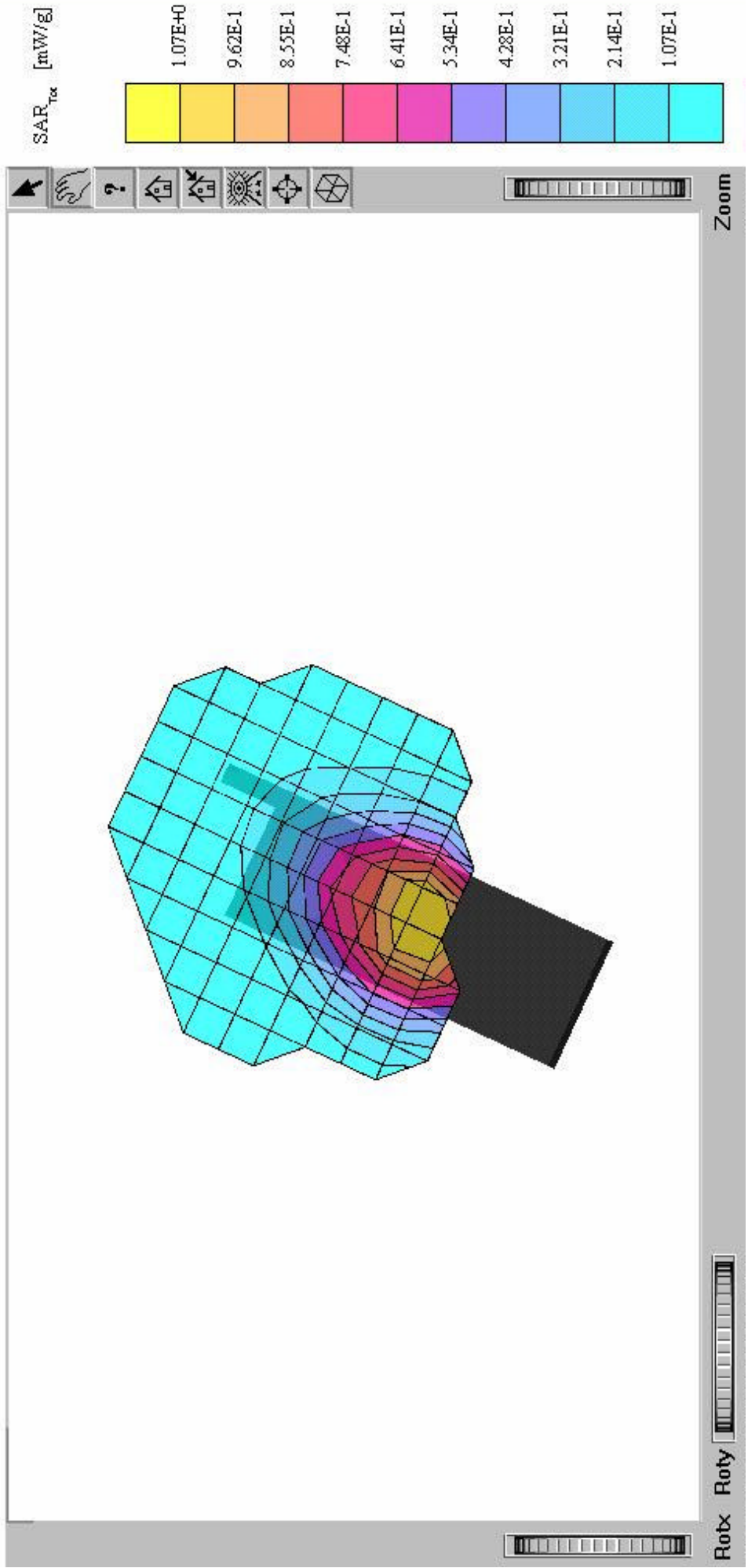
File Name: QCP-2760 6-18-99 #8.DA3

Operator: DWS



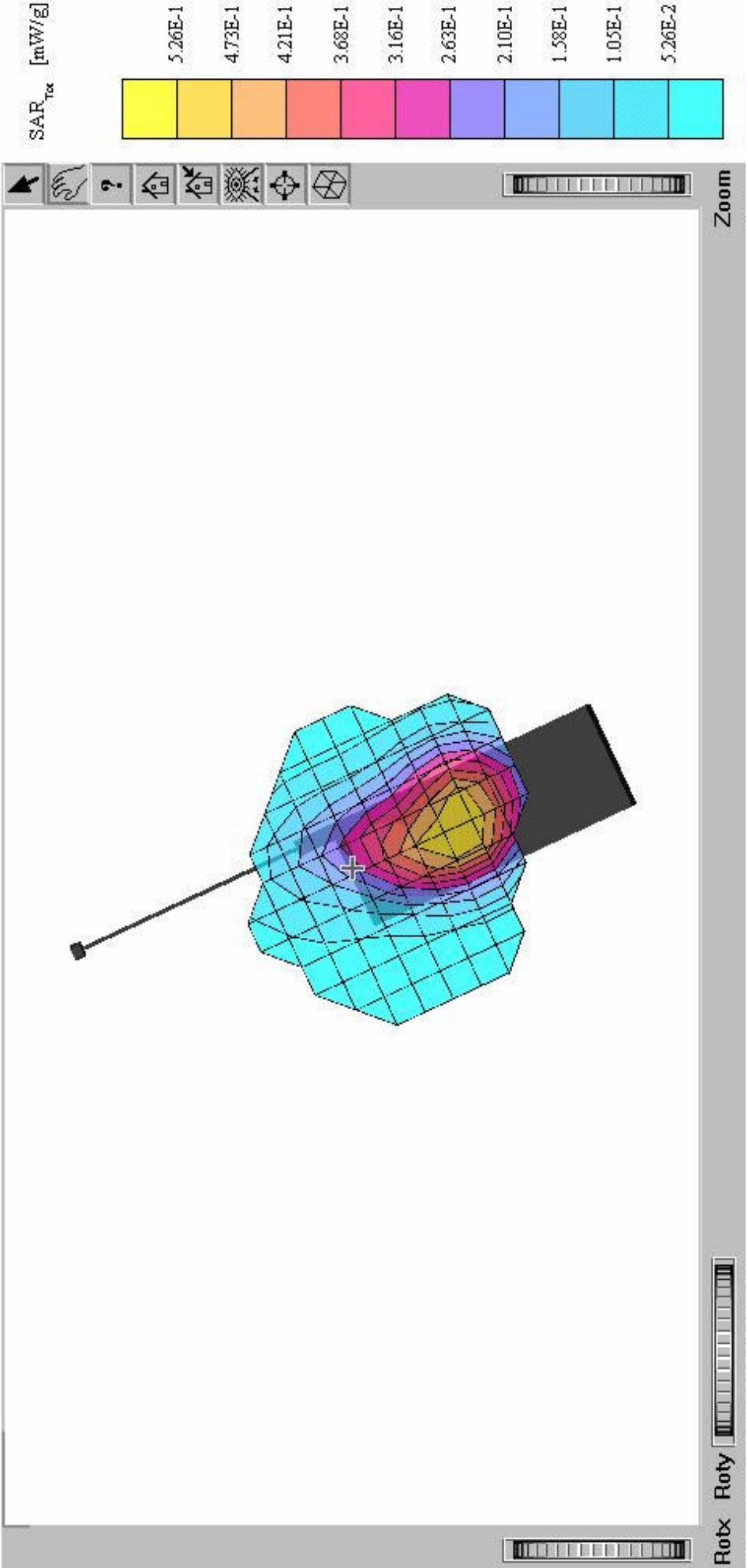
QCP 2760 #WKVR 6-18-99, LEFT HEAD, 25.55dBm CONDUCTED, CHANNEL 799

SAR (1g): 0.989 [mW/g] ± 0.18 dB, SAR (10g): 0.767 [mW/g] ± 0.18 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.01 dB
File Name: QCP-2760 6-18-99 #9.DA3
Operator: DWS



QCP 2760 #WKVR 6-18-99, RIGHT HEAD, 25.5dBm CONDUCTED, CHANNEL 991

SAR (1g): 0.580 [mW/g] \pm 0.26 dB, SAR (10g): 0.448 [mW/g] \pm 0.37 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.08 dB
File Name: QCP 2760 6-18-99 #10.DA3
Operator: DWS



QCP 2760 #WKVR 6-18-99, RIGHT HEAD, 25.5dBm CONDUCTED, CHANNEL 991

SAR(1g): 1.28 [mW/g] ± 0.31 dB, SAR(10g): 1.00 [mW/g] ± 0.29 dB

Cubes (2) (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

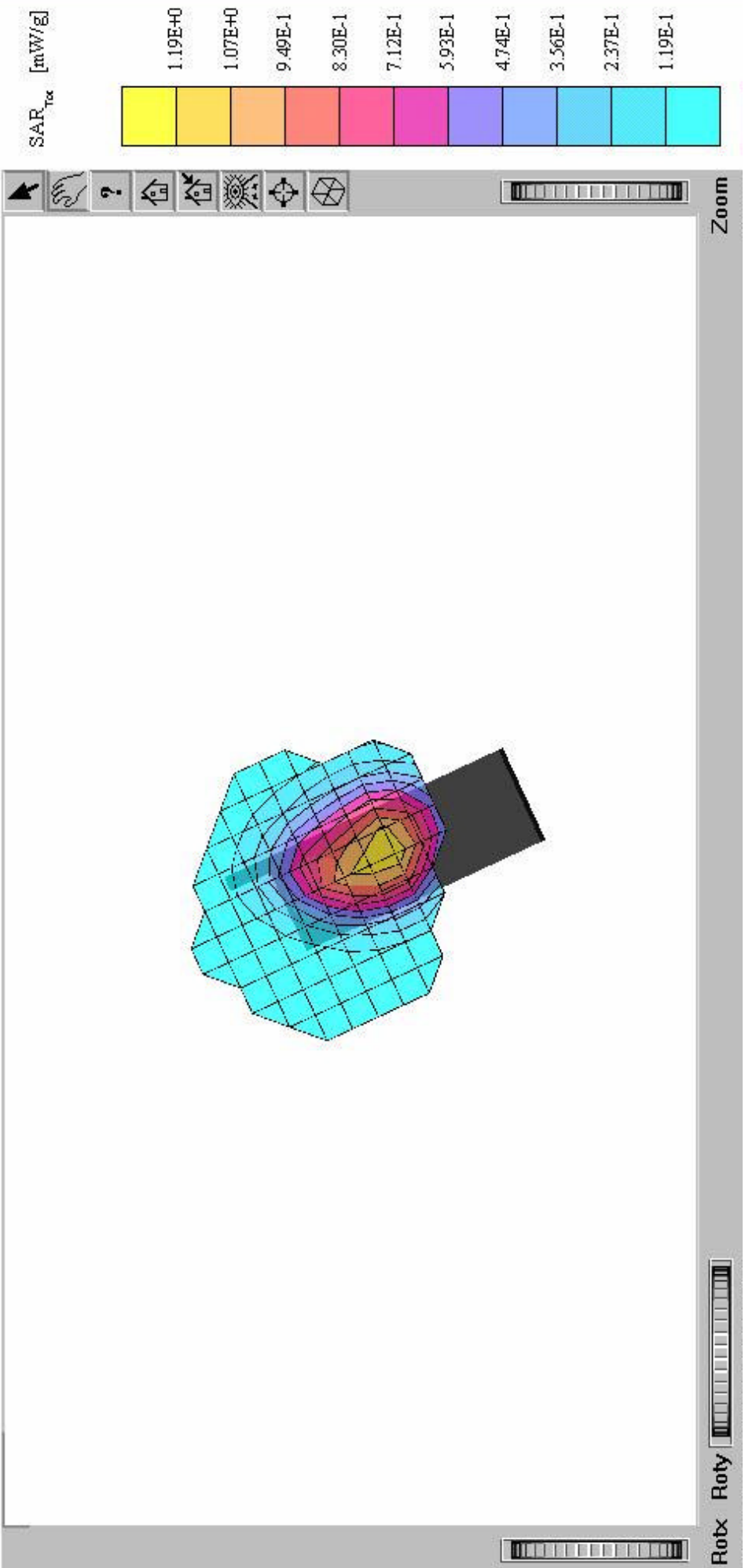
Generic Twin Phantom; Right Hand Section

Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)

Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³];

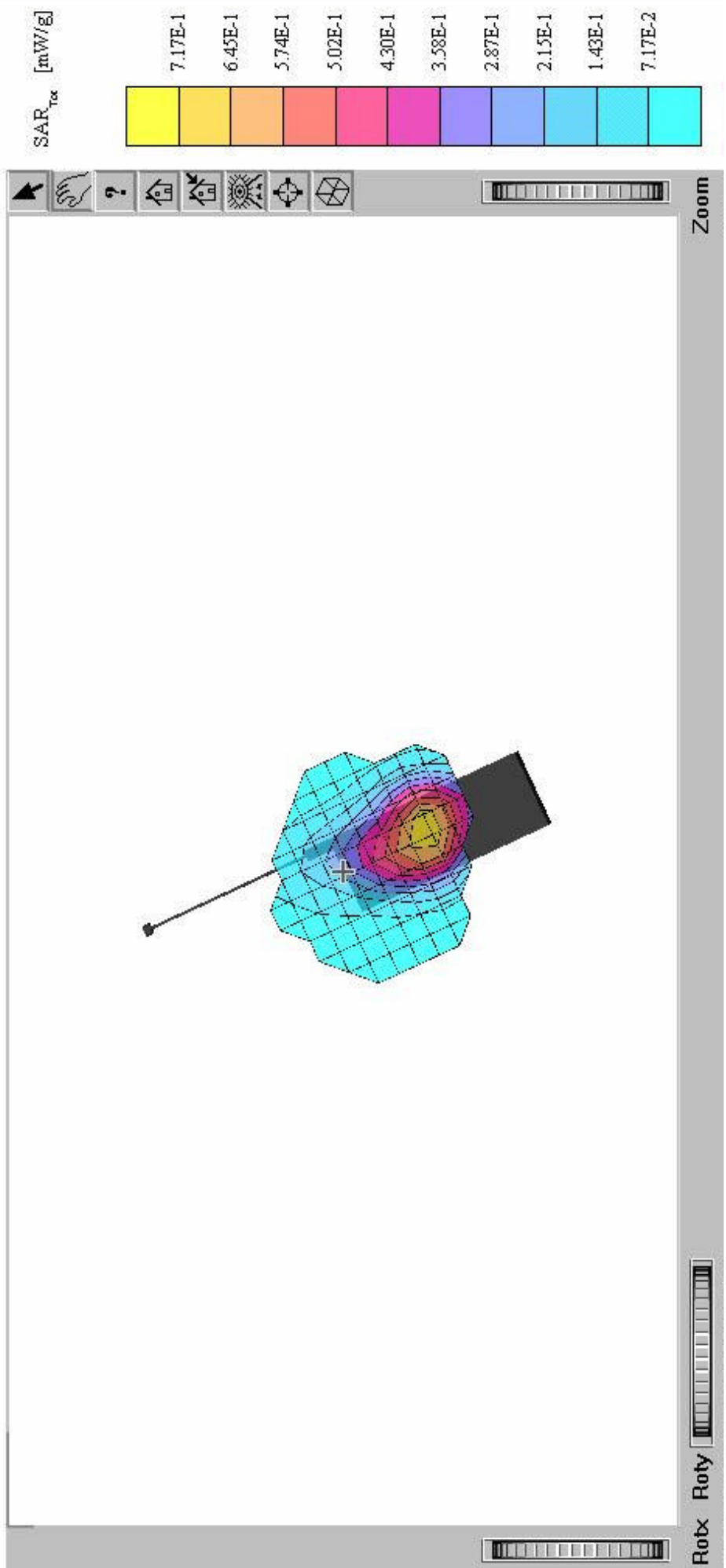
File Name: QCP 2760 6-18-99 #10.DA3

Operator: DWS



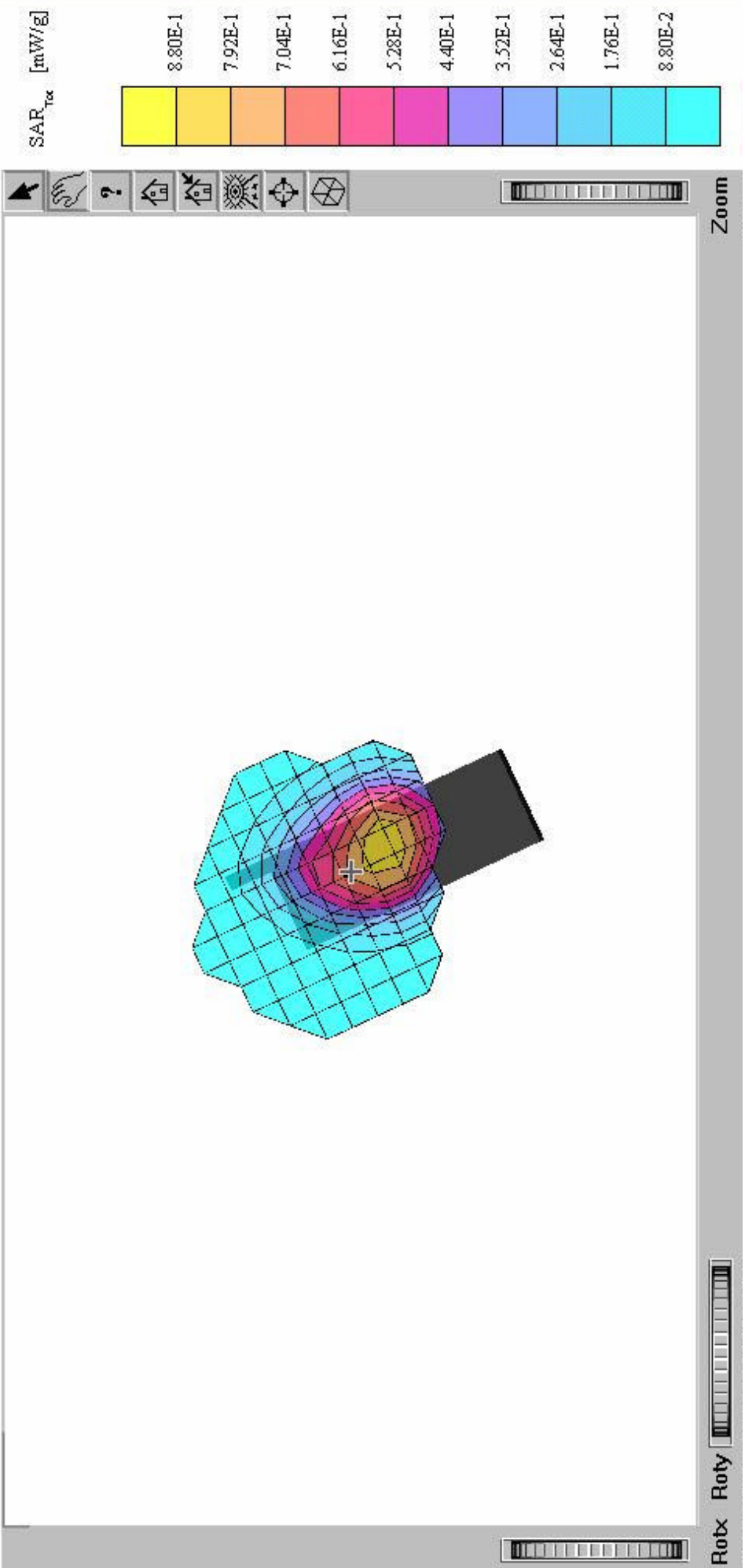
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 25.37dBm CONDUCTED, CHANNEL 383

SAR (1g): 0.762 [mW/g] ± 0.29 dB, SAR (10g): 0.595 [mW/g] ± 0.30 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain, 900 MHz. $\sigma = 0.82$ [rho/m] $\epsilon_r = 41.8$, $\rho = 1.00$ [g/cm³]; Powerdrift: -0.00 dB
File Name: QCP 2760 6-19-99 #3.DA3
Operator: DWS



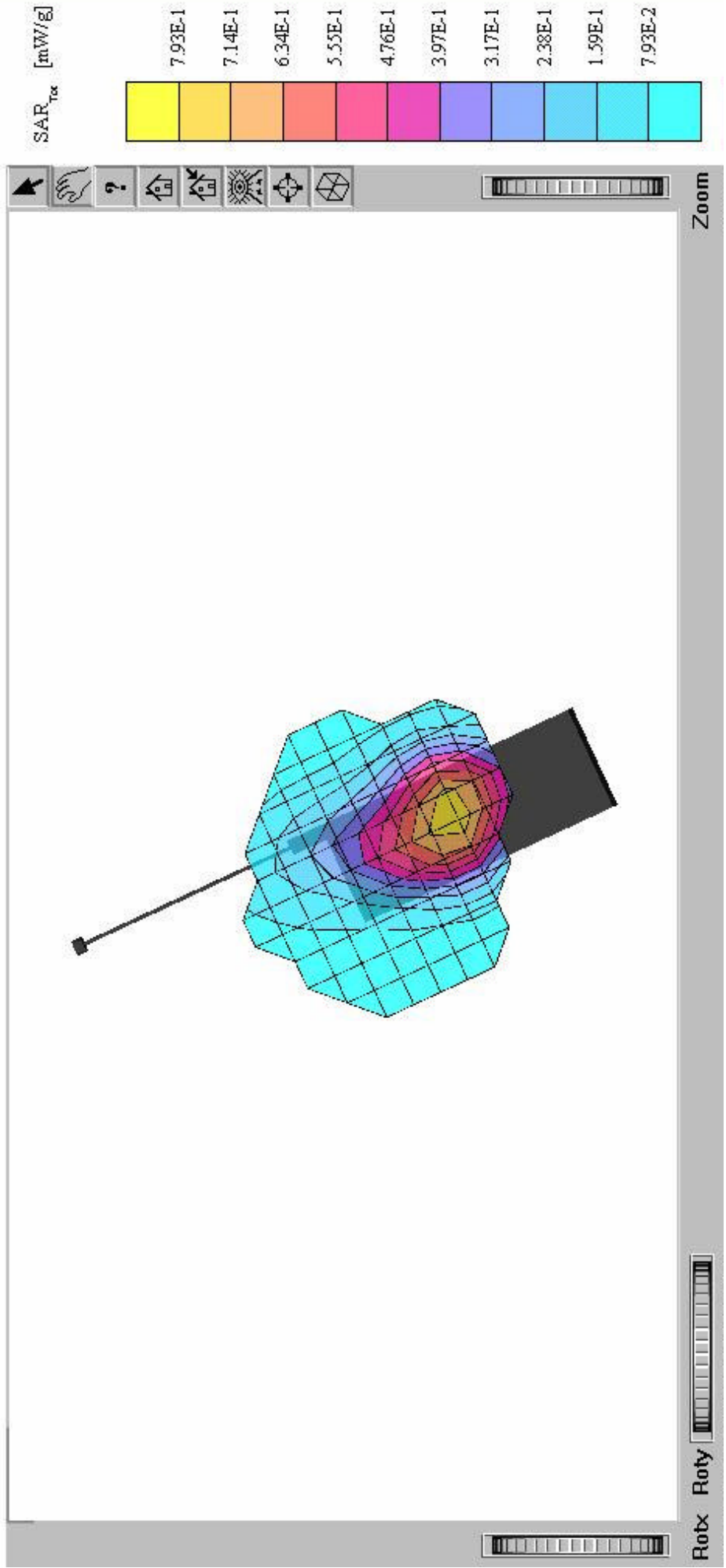
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 25.37dBm CONDUCTED, CHANNEL 383

SAR (1g): 0.972 [mW/g] ± 0.34 dB, SAR (10g): 0.757 [mW/g] ± 0.29 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [mho/m] $\epsilon_r = 41.8$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.19 dB
File Name: QCP 2760 6-19-99 #4.DA3
Operator: DWS



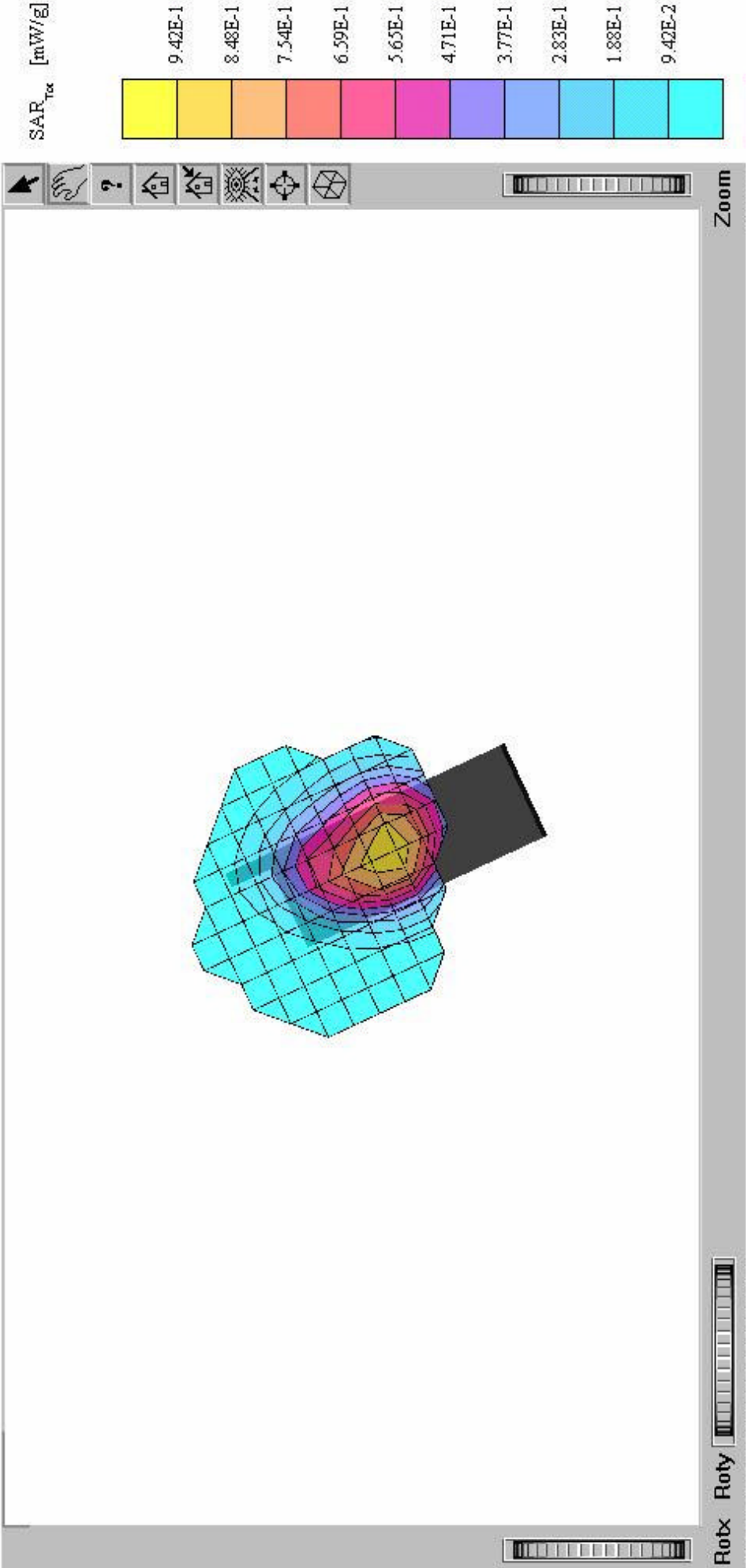
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 25.55dBm CONDUCTED, CHANNEL 799

SAR (1g): 0.853 [mW/g] ± 0.35 dB, SAR (10g): 0.667 [mW/g] ± 0.33 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain, 900 MHz. $\sigma = 0.82$ [rho/m] $\epsilon_r = 41.8$, $\rho = 1.00$ [g/cm³]; Powerdrift: -0.09 dB
File Name: QCP 2760 6-19-99 #5.DA3
Operator: DWS



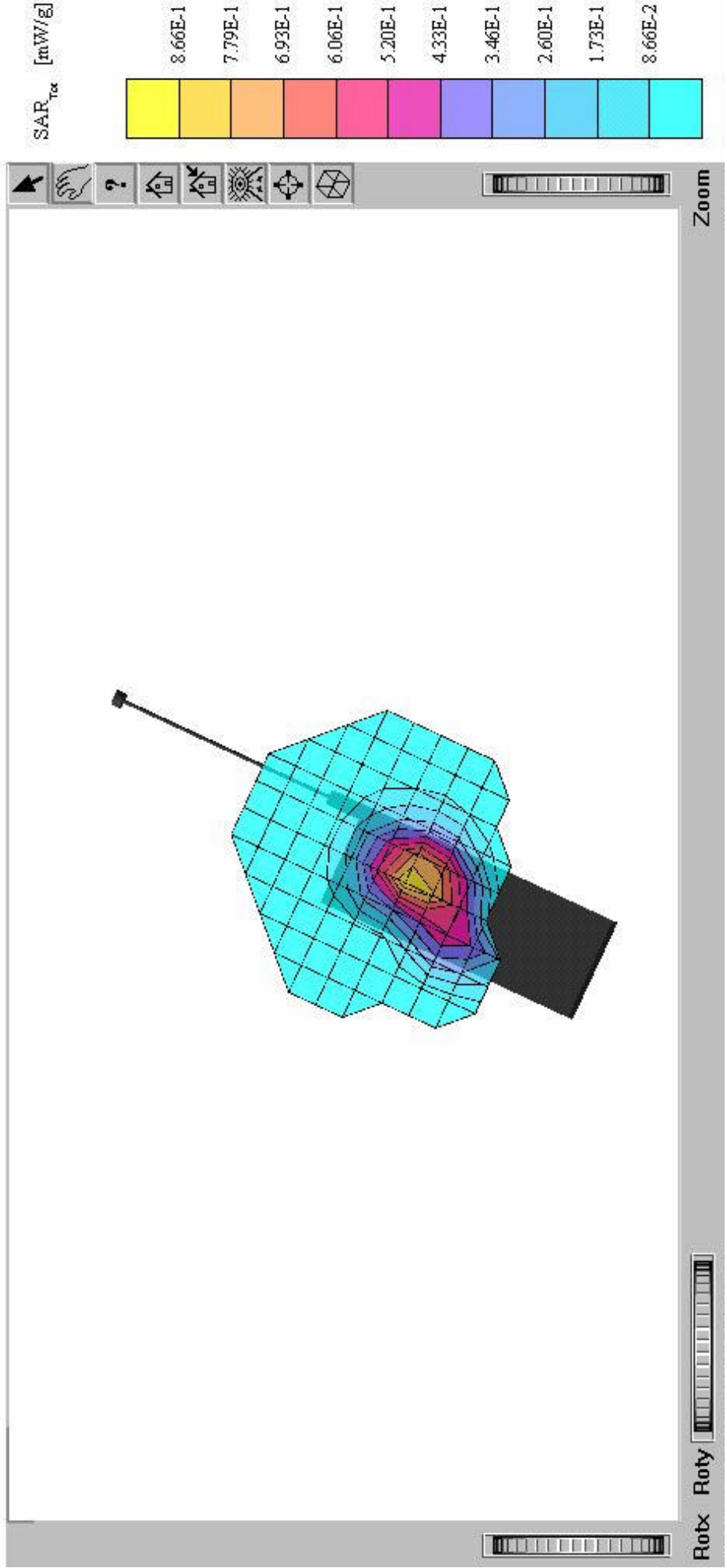
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 25.55dBm CONDUCTED, CHANNEL 799

SAR(1g): 1.01 [mW/g] ± 0.32 dB, SAR(10g): 0.793 [mW/g] ± 0.31 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.90,5.90,5.90)
Brain 900 MHz: $\sigma = 0.82$ [rho/m]; $\epsilon_r = 41.8$; $\rho = 1.00$ [g/cm³]; Powerdrift: 0.06 dB
File Name: QCP 2760 6-19-99 #6.DA3
Operator: DWS



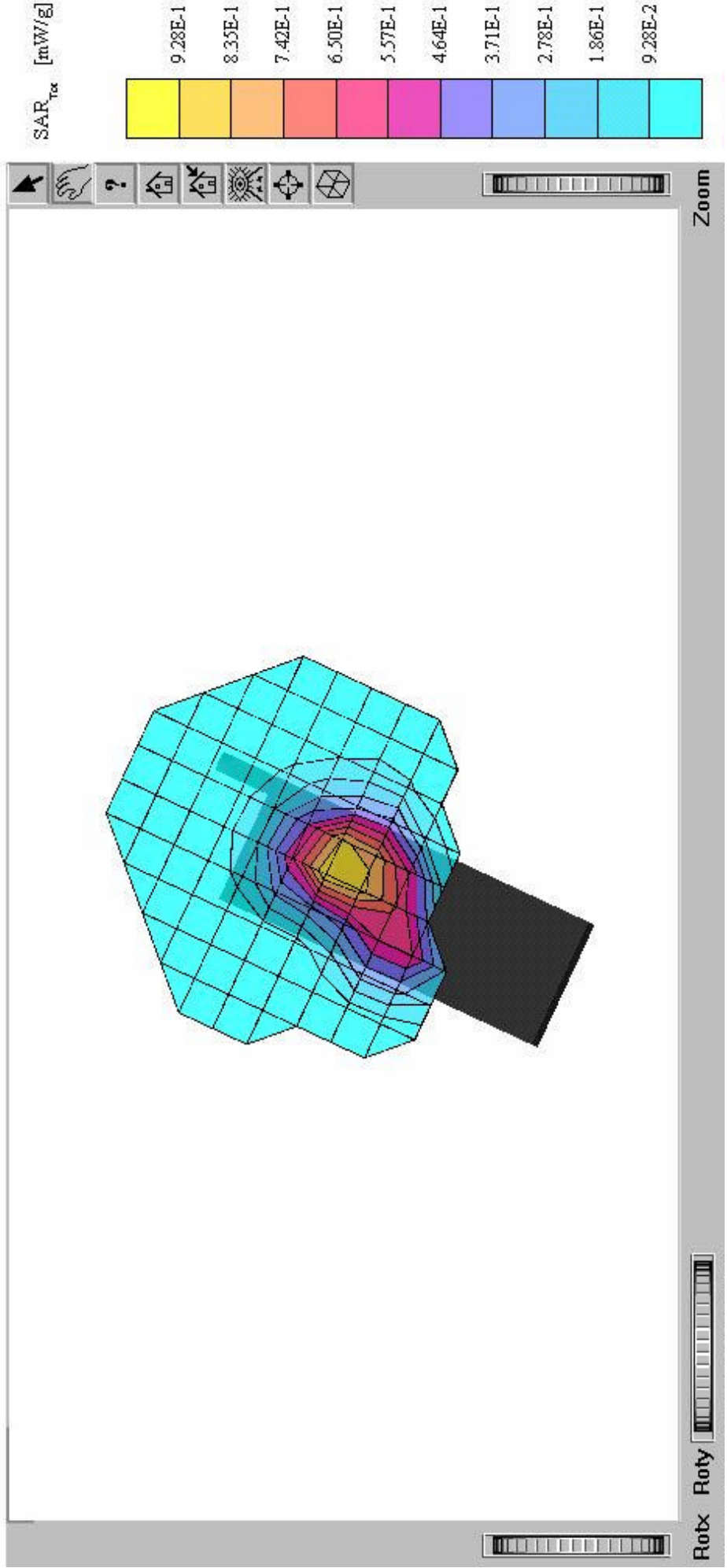
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.1dBm CONDUCTED, CHANNEL 75

SAR (1g): 1.12 [mW/g] ± 0.12 dB; SAR (10g): 0.620 [mW/g] ± 0.09 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.02 dB
File Name: QCP 2760 6-21-99 #1.DA3
Operator: DWS



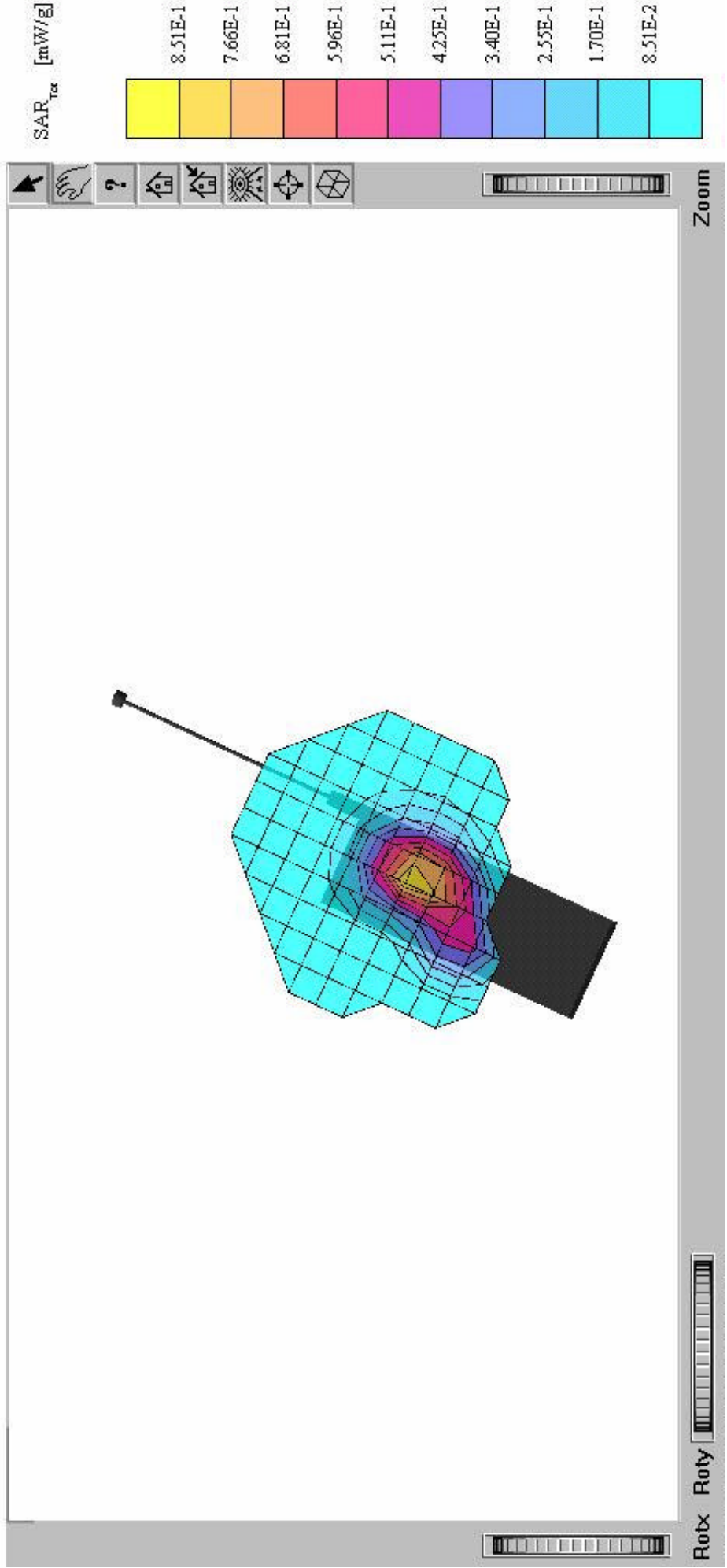
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.1dBm CONDUCTED, CHANNEL 75

SAR (1g): 1.13 [mW/g] ± 0.17 dB, SAR (10g): 0.633 [mW/g] ± 0.14 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.18 dB
File Name: QCP 2760 6-21-99 #2.DA3
Operator: DWS



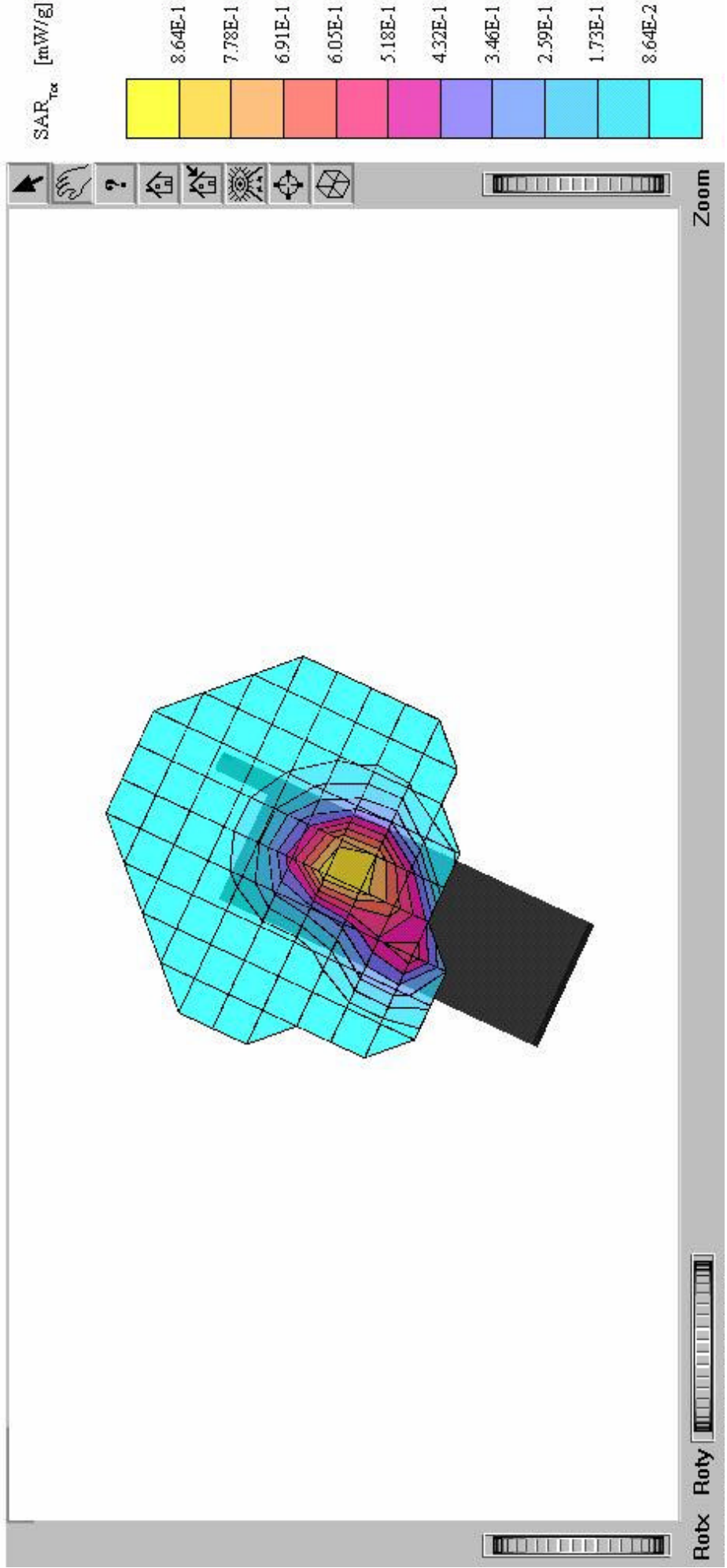
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.05dBm CONDUCTED, CHANNEL 600

SAR(1g): 1.15 [mW/g] ± 0.18 dB; SAR(10g): 0.620 [mW/g] ± 0.14 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.00 dB
File Name: QCP 2760 6-21-99 #3.DA3
Operator: DWS



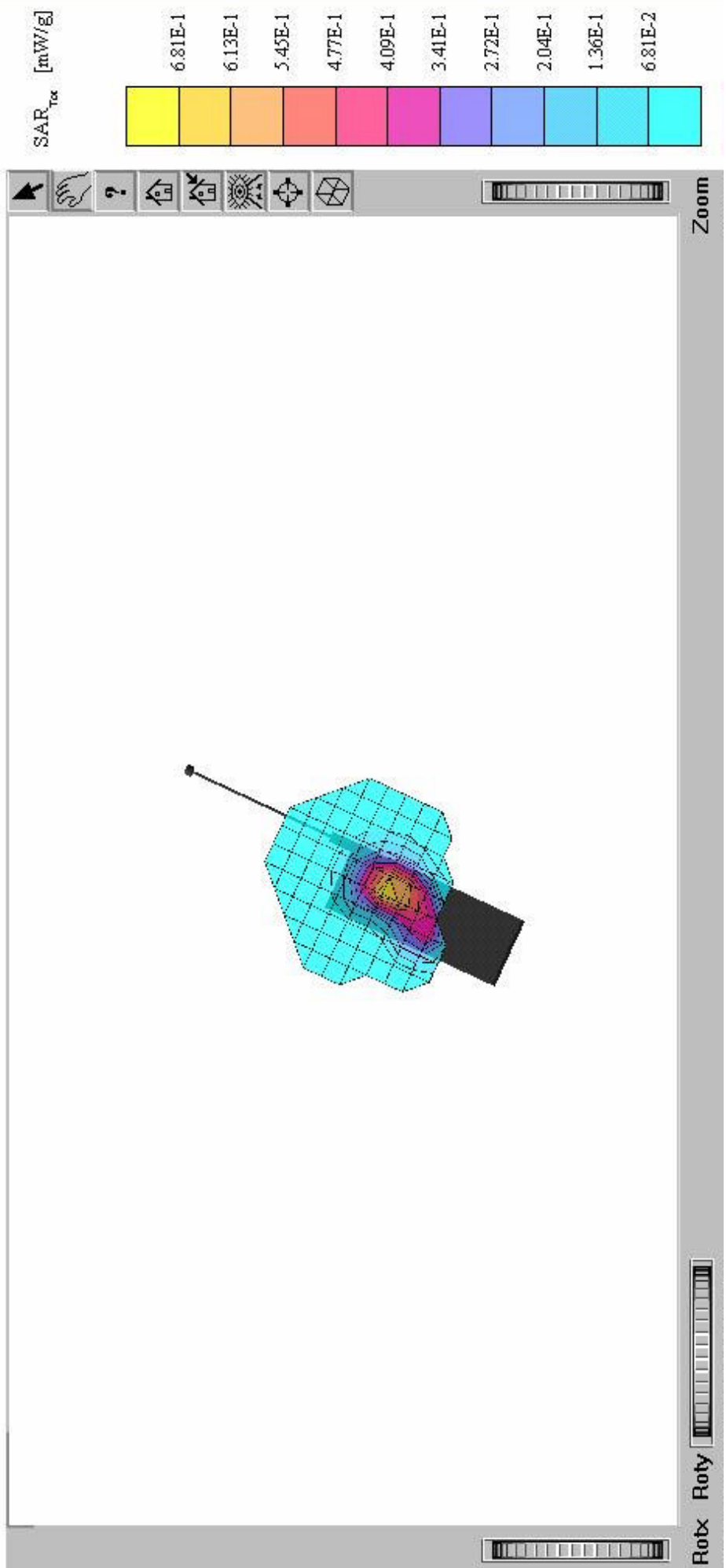
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.05dBm CONDUCTED, CHANNEL 600

SAR(1g): 1.15 [mW/g] ± 0.34 dB, SAR(10g): 0.629 [mW/g] ± 0.24 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.08 dB
File Name: QCP 2760 6-21-99 #4.DA3
Operator: DWS



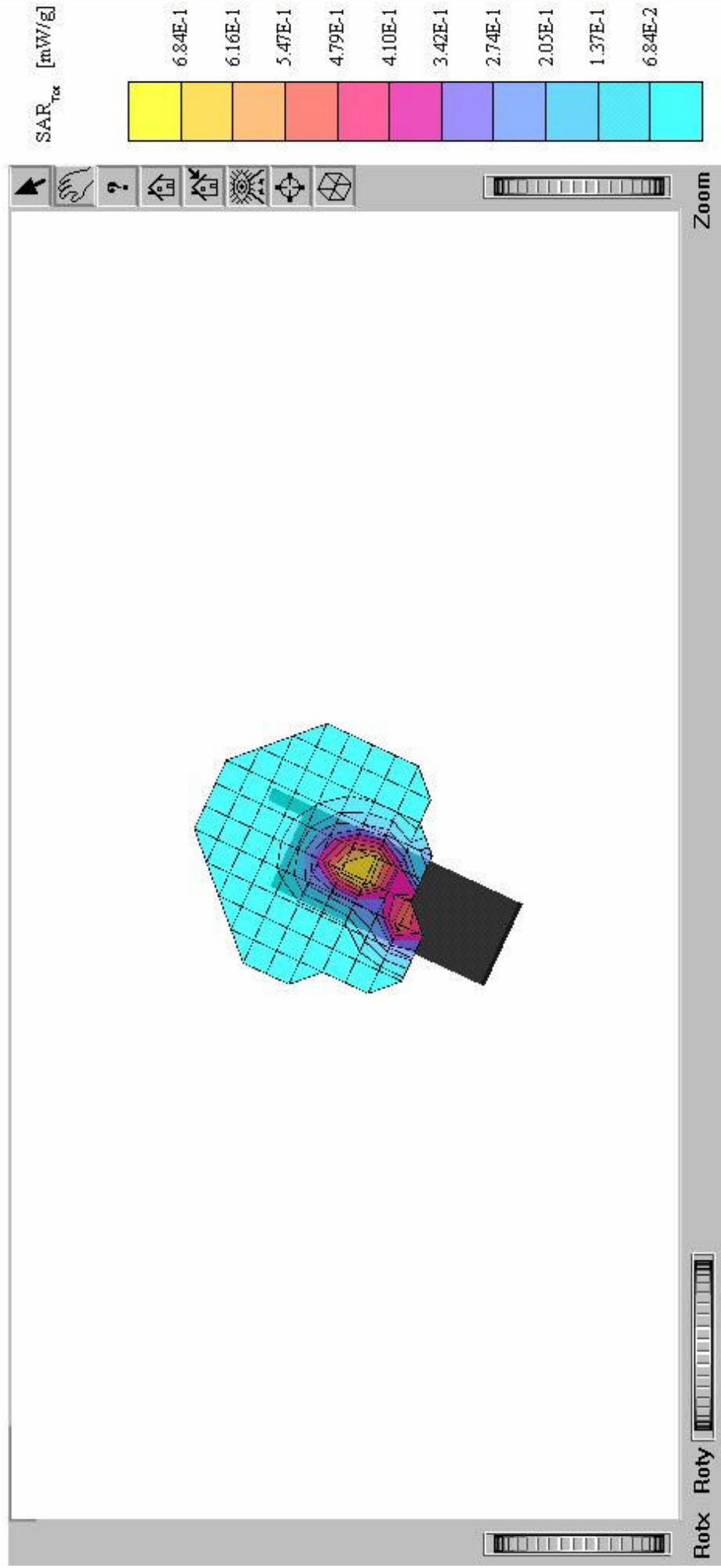
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.1dBm CONDUCTED, CHANNEL 1175

SAR (1g): 0.942 [mW/g] ± 0.17 dB, SAR (10g): 0.505 [mW/g] ± 0.13 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.03 dB
File Name: QCP 2760 6-21-99 #5.DA3
Operator: DWS



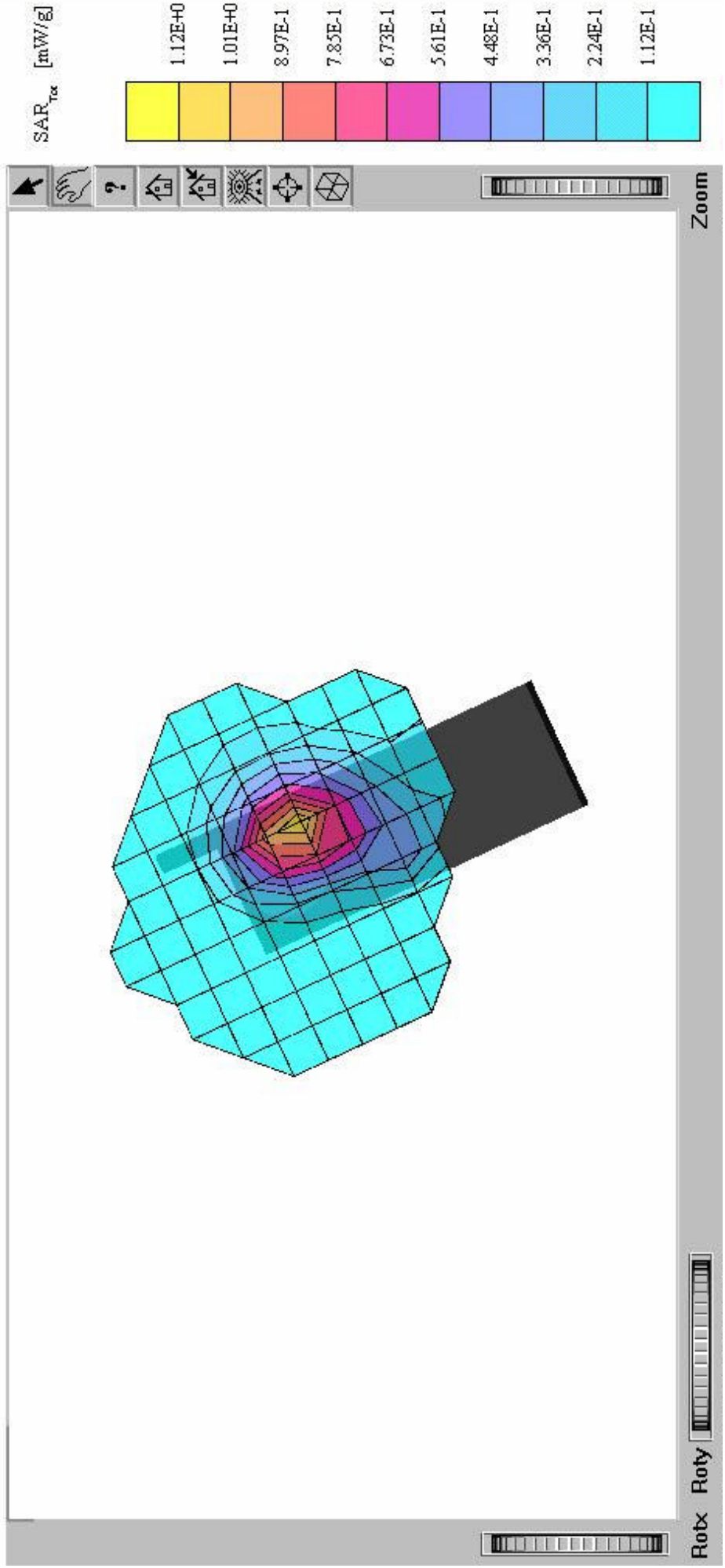
QCP 2760 #WKVR 6-21-99, LEFT HEAD, 23.1dBm CONDUCTED, CHANNEL 1175

SAR (1g): 0.921 [mW/g] ± 0.22 dB, SAR (10g): 0.492 [mW/g] ± 0.19 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Left Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 42.3$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.19 dB
File Name: QCP 2760 6-21-99 #6.DA3
Operator: DWS



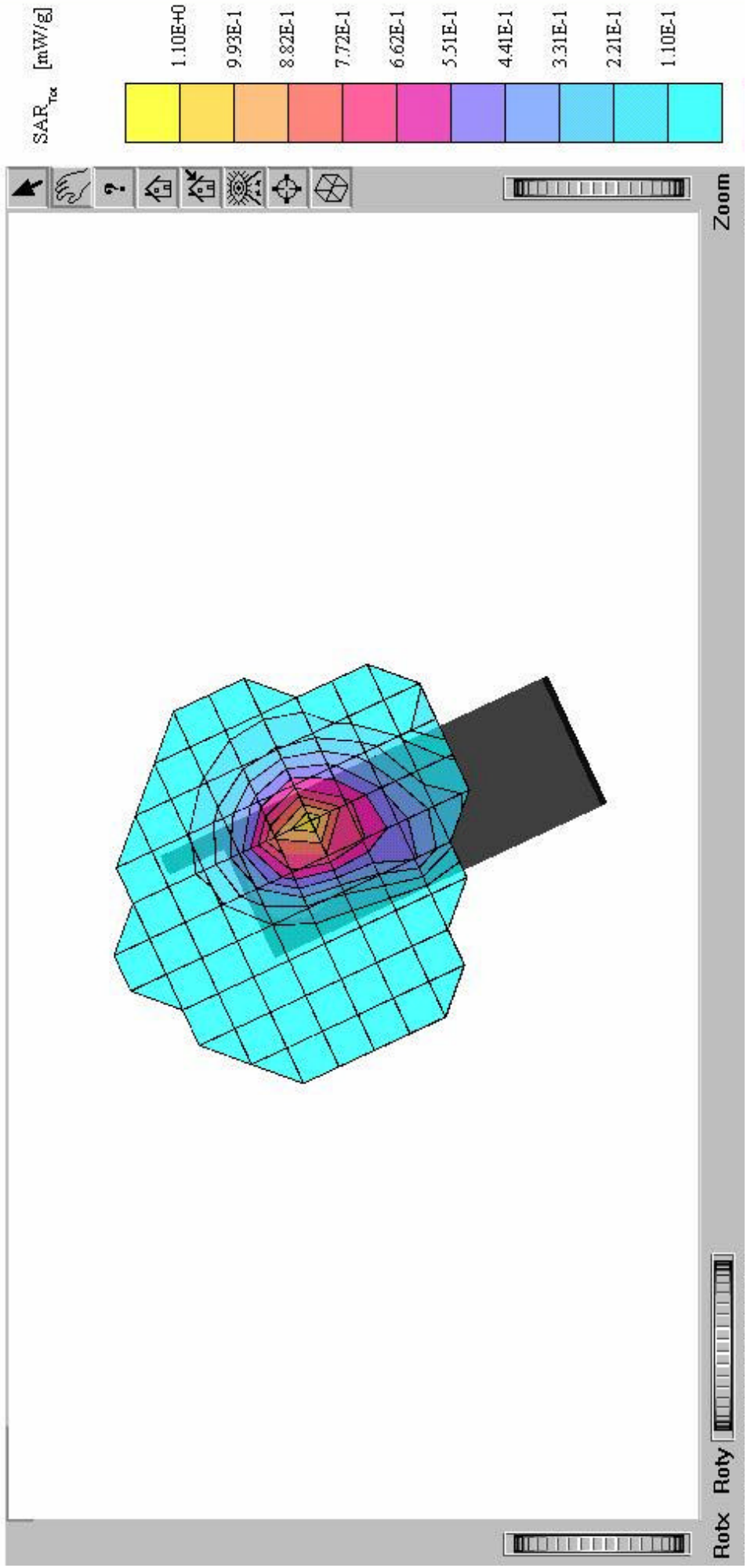
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.1dBm CONDUCTED, CHANNEL 75

SAR(1g): 1.03 [mW/g] ± 0.08 dB, SAR(10g): 0.590 [mW/g] ± 0.14 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.07 dB
File Name: QCP 2760 6-19-99 #7 DA3
Operator: DWS



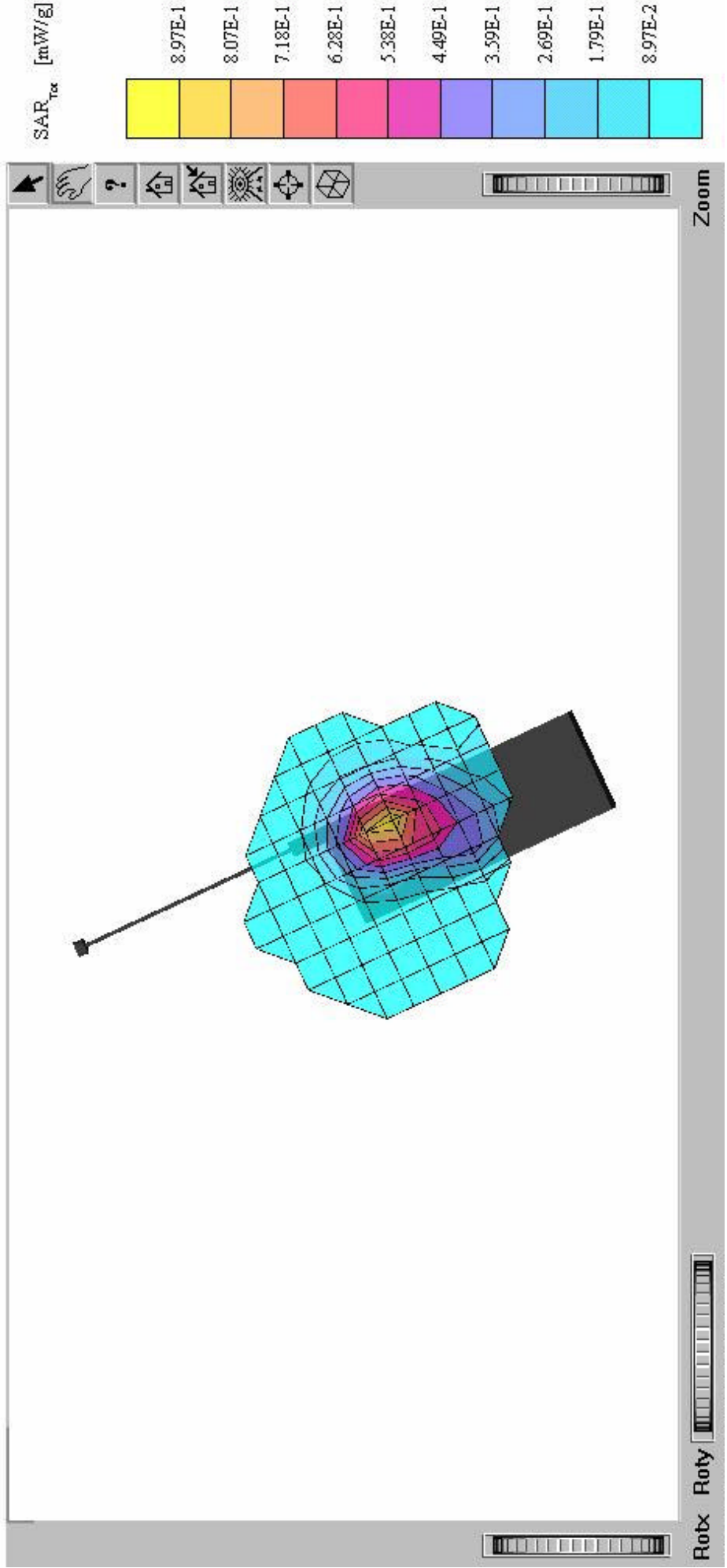
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.1dBm CONDUCTED, CHANNEL 75

SAR (1g): 0.991 [mW/g] \pm 0.25 dB, SAR (10g): 0.557 [mW/g] \pm 0.28 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.19 dB
File Name: QCP 2760 6-19-99 #8.DA3
Operator: DWS



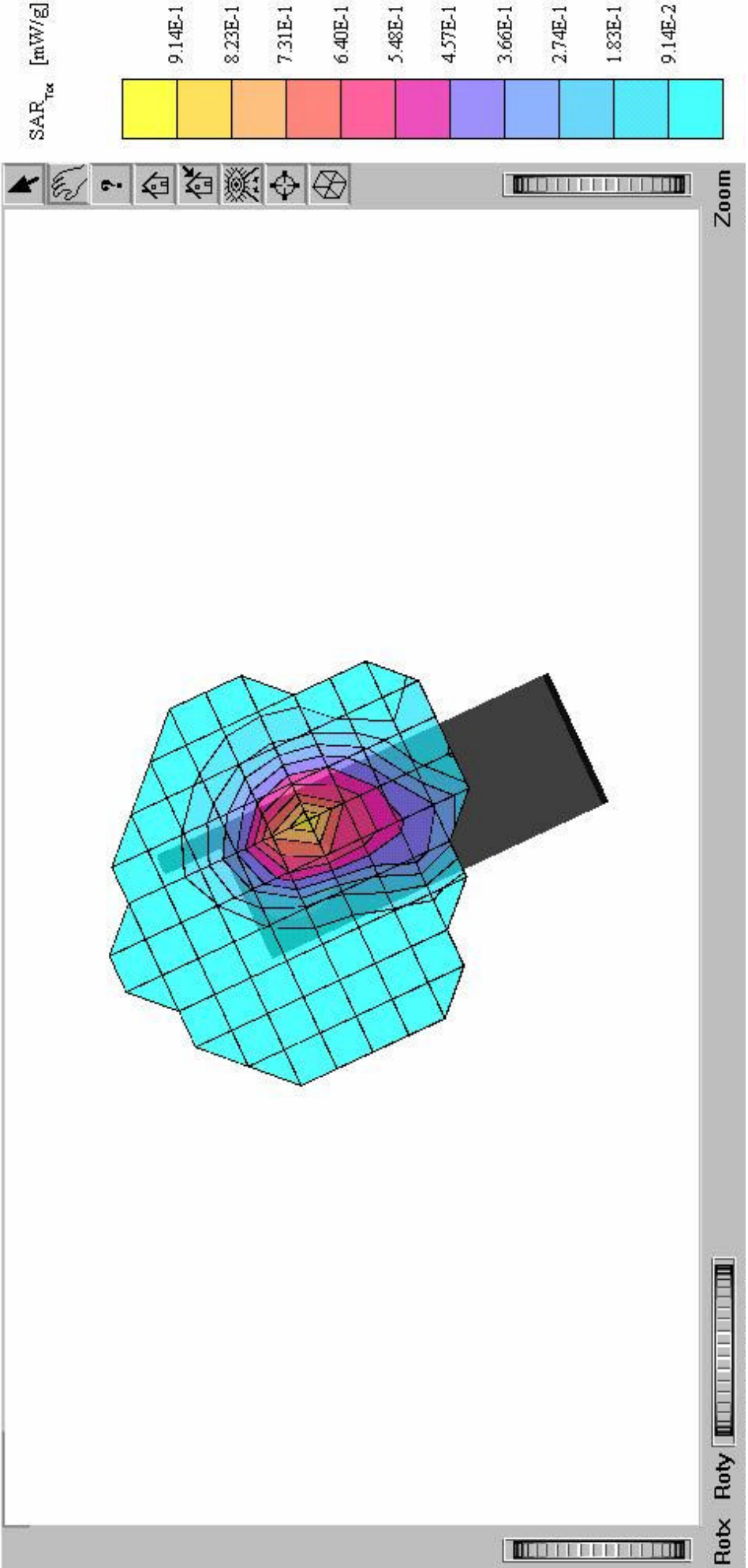
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.05dBm CONDUCTED, CHANNEL 600

SAR (1g): 0.888 [mW/g] ± 0.17 dB, SAR (10g): 0.503 [mW/g] ± 0.16 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.03 dB
File Name: QCP 2760 6-19-99 #9 DA3
Operator: DWS



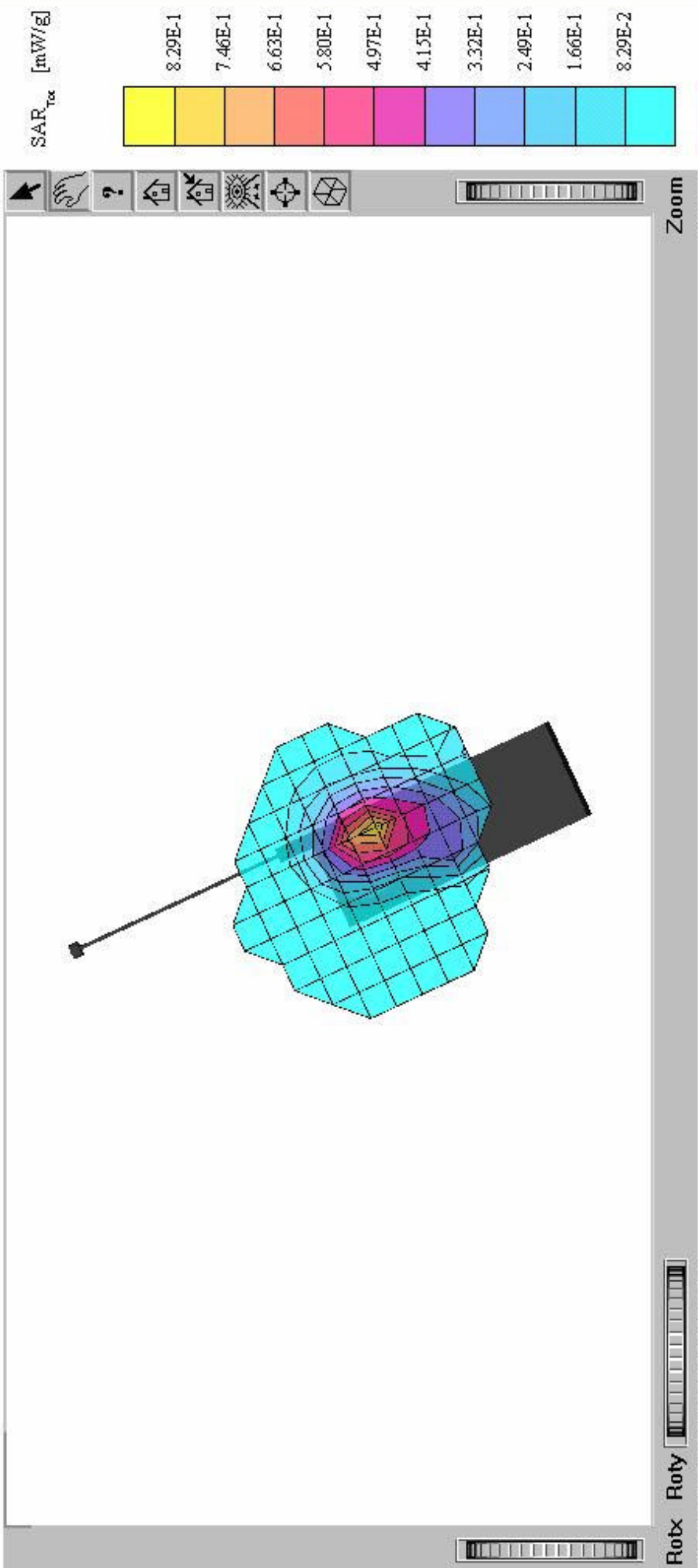
QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.05dBm CONDUCTED, CHANNEL 600

SAR (1g): 0.868 [mW/g] ± 0.20 dB, SAR (10g): 0.493 [mW/g] ± 0.18 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: -0.97 dB
File Name: QCP 2760 6-19-99 #10.DA3
Operator: DWS



QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.1dBm CONDUCTED, CHANNEL 1175

SAR (1g): 0.765 [mW/g] ± 0.15 dB, SAR (10g): 0.428 [mW/g] ± 0.14 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5 00,5 00,5 00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.12 dB
File Name: QCP 2760 6-19-99 #11.DA3
Operator: DWS



QCP 2760 #WKVR 6-19-99, RIGHT HEAD, 23.1dBm CONDUCTED, CHANNEL 1175

SAR (1g): 0.739 [mW/g] ± 0.22 dB, SAR (10g): 0.409 [mW/g] ± 0.21 dB
Cubes (2) (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Generic Twin Phantom; Right Hand Section
Probe: ET3DV5 - SN1348; ConvF(5.00,5.00,5.00)
Brain 1800 MHz: $\sigma = 1.62$ [mho/m] $\epsilon_r = 40.5$ $\rho = 1.00$ [g/cm³]; Powerdrift: 0.00 dB
File Name: QCP 2760 6-19-99 #12.DA3
Operator: DWS

