

# DONALD L. HAES, JR., CHP, CLSO

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June 23, 2020

**RE: Response to Highlighted Questions Concerning the installation of a proposed AT&T Mobility “Small Cell” personal wireless services facility to be located on utility poles within Wellesley, MA.**

*Stipulation: I am a voting member of the International Committee on Electromagnetic Safety (ICES) and the Institute of Electrical and Electronics Engineers (IEEE), including the Standards Association (IEEE/SA). I am the Vice Chair of IEEE/ICES TC95 Subcommittee 2 titled “Terminology, Units of Measurements, and Hazard Communications”. I am also the Secretary of the Committee on Man and Radiation (COMAR), an IEEE Engineering in Medicine and Biology Society (EMBS). All opinions expressed in this presentation are my own, and are not intended to represent those of ICES, IEEE, the IEEE SA, COMAR, or the EMBS.*

## Response to Questions Regarding AT&T Small Cell Installations On Utility Poles Within Wellesley, MA.

Party Questioning	Question
Alan Bodnar	<p>We are writing to express our concern about the plan to install an AT&amp;T Small Cell Antenna on the utility pole between 79 and 85 Mayo Road. It has come to our attention that this device emits a significant amount of vertical radiation downward toward ground level in contrast to the current system, which mainly emits smaller amounts of radiation horizontally. Although the radiation output of the AT&amp;T system (900 mW/m<sup>2</sup>) falls below the FCC’s maximum permitted exposure level of 10,000 mW/m<sup>2</sup>, it is significantly greater than that recommended by the World Health Organization (10mW/m<sup>2</sup>) and in effect in other countries including Switzerland (100 mW/m<sup>2</sup>) and Germany (10mW/m<sup>2</sup>). Closer to home, Burlington and Cambridge have each formed Small Cell Committees that developed new criteria for Small Cell projects to protect public interests and health. Their guidelines explicitly indicate that residential areas, parks, and historic districts are the least preferable locations for Small Cell antennae. For the health and safety of our Mayo Road neighborhood and other areas of Wellesley that may be impacted by this plan, we are asking that Wellesley re-evaluate the proposed AT&amp;T Small Cell system carefully before implementing and activating it. Furthermore, we are asking that Wellesley formally notify residents of areas adjacent to proposed Small Cell sites, so that they may have the opportunity to voice any concerns that they might have about these plans.</p>
	<p>Response: While I’m not sure where the value of “radiation output of the AT&amp;T system (900 mW/m<sup>2</sup>)” originated, I note the acknowledgement that the (predicted) levels (of electromagnetic radiation) “falls below the FCC’s maximum permitted exposure level of 10,000 mW/m<sup>2</sup>” (1.0 mW/cm<sup>2</sup>). It is important to note that the World Health Organization (WHO) <b>does not develop</b> standards and/or guidelines for exposure to electromagnetic radiation (colloquially known as “EMF”). Instead, they make recommendations to follow the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Note that the ICNIRP GUIDELINES FOR LIMITING EXPOSURE TO ELECTROMAGNETIC FIELDS (100 KHZ TO 300 GHZ) have been published in the Health Physics Journal (Health Phys 118(5): 483–524; 2020) and can be found online here:</p>

<https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>. The specific values, referenced to as the “Basic Restrictions”, for members of the general public is an “Whole-body average SAR (Specific Absorption Rate) of 0.08 W kg<sup>-1</sup>”. This is the exact same value as ICES and the Federal Communications Commission (FCC). They also refer to “Reference Levels” which “...have been derived from a combination of computational and measurement studies to provide a means of demonstrating compliance using quantities that are more-easily assessed than basic restrictions, but that provide an equivalent level of protection to the basic restrictions for worst-case exposure scenarios. However, as the derivations rely on conservative assumptions, in most exposure scenarios the reference levels will be more conservative than the corresponding basic restrictions.” Note that the values published by ICNIRP are the SAME as the values listed by the FCC at the frequencies to be used by AT&T on the Small Cells (SC) to be deployed in Wellesley, MA. Reference below (**bold italics are my emphasis**): <https://www.who.int/peh-emf/standards/en/> *A number of national and international organizations have formulated guidelines establishing limits for occupational and residential EMF exposure. The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - a non-governmental organization formally recognised by WHO, were developed following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences. **The main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health.***

Alasdair McLean-Foreman

Please confirm power specifications for the Small Cell Antenna? Output in terms of 1) watts 2) Effective Radiated power (ERP) watts? What are dimensions of the unit? Will we have an opportunity to request a RF exposure measurement at our property before unit is activated? Is there an option of moving the unit to an alternative location that is not directly outside our unobstructed property?

Response: *ERP (Effective Radiated Power) is the directional (RF) power (in watts) that would have to be radiated by a half-wave dipole antenna to give the same radiation intensity as the actual source at a distant receiver located in the direction of the antenna's strongest beam (main lobe). ERP measures the combination of the power emitted by the transmitter and the ability of the antenna to direct that power in a given direction. It is equal to the input power to the antenna multiplied by the gain of the antenna. (Source Wiki).* For the AT&T SC at 79 Mayo Road, Wellesley, MA, there are three different technologies with distinct FCC-licensed frequency bands proposed to be used, which have their own transmitting “radio” (referred to as either a Remote Radio Head (RRH) or Unit (RRU). In addition, there are differing antenna “gain” values based on the frequency of the transmitter input. They are as follows: (1) RRUS-RRU 4415 @ 1930 MHz band (PCS-1900), 4 X 40 watts into the Galtronics/GQ2412-00613 antenna with a maximum gain of 6.75 dBd gives 379 watts ERP; (2) RRU 4449 @ 720 MHz band (LTE-700), 1 X 40 watts into the Galtronics/GQ2412-00613 antenna with a maximum gain of 5.65 dBd gives 220 watts ERP; and, (3) RRU 4449 @ 850 MHz band (UMTS-850), 1 X 40 watts into the Galtronics/GQ2412-00613 antenna with a maximum gain of 5.65 dBd gives 220 watts ERP. While NOT specifically proposed for this location, the antenna has ports for two additional technologies, and have been included in my evaluation dated June 15, 2020 and are as follows: (1) CBRS @ 3550-3700 MHz band (CBRS), 2 X 50 watts into the Galtronics/GQ2412-00613 antenna with a maximum gain of 8.9 dBd gives 757 watts ERP; and (2) 5150-5925 MHz band (UNii), 1 X 1 watts into the Galtronics/GQ2412-00613 antenna with a maximum gain of 7.8 dBd gives 147 watts ERP. Note that “CBRS” refers to the Citizens Broadband Radio Service, and “UNii” refers to the Unlicensed band ≈ 5 GHz (similar power and frequency to home and office Wi-Fi”).

Sarah Little  
Doug Hersh

I applaud your efforts to serve the town and in general support increased connectivity, particularly providing internet access. However, I have read the safety literature on RF,

which can be summed up by this quote from the American Cancer Institute: "Most expert organizations agree that more research is needed to help clarify this, especially for any possible long-term effects." I live at 14 Montvale Rd in Wellesley and my husband and I do not own cell phones. I respectfully request that you do not site an emitter outside my bedroom window on the telephone pole (marked "Wellesley 3") across the street.

Response: Assuming you are referencing the American Cancer Society (ACS), their website <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radiofrequency-radiation.html> notes [the ACS](#) "does not have any official position or statement on whether or not radiofrequency radiation from cell phones, cell phones towers, or other sources is a cause of cancer. ACS generally looks to other expert organizations to determine if something causes cancer (that is, if it is a carcinogen), including:

- The International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO)
- The US National Toxicology Program (NTP), which is formed from parts of several different government agencies, including the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA)

Other major organizations might also comment on the ability of certain exposures to cause cancer.

- Based on a review of studies published up until 2011, the International Agency for Research on Cancer (IARC) has classified RF radiation as "possibly carcinogenic to humans," based on limited evidence of a possible increase in risk for brain tumors among cell phone users, and inadequate evidence for other types of cancer. (For more information on the IARC classification system, see *Known and Probable Human Carcinogens*.)
- More recently, the US Food and Drug Administration (FDA) issued a technical report based on results of studies published between 2008 and 2018, as well as national trends in cancer rates. The report concluded: "Based on the studies that are described in detail in this report, there is insufficient evidence to support a causal association between radiofrequency radiation (RFR) exposure and [tumor formation]."

So far, the National Toxicology Program (NTP) has not included RF radiation in its Report on Carcinogens, which lists exposures that are known to be or reasonably anticipated to be human carcinogens. (For more on this report, see *Known and Probable Human Carcinogens*.)

- According to the US Federal Communications Commission (FCC):

"[C]urrently no scientific evidence establishes a causal link between wireless device use and cancer or other illnesses. Those evaluating the potential risks of using wireless devices agree that more and longer-term studies should explore whether there is a better basis for RF safety standards than is currently used."

As I noted during the recent public meeting, the emissions standards are under constant review and consideration and the FCC recently reaffirmed its requirements related to emissions (see discussion below).

Iris Lin  
(YungChing  
Lin) &  
Meng-Ju  
Wu

Another document is research done by Dr. Ron Powell. It summarized the health concerns based on 67 scientific studies. The first two pages are conclusion and observations. Few highlights below: 1) The first one states that the FCC standard is too high to provide any protection to the public, which echo that the standard in Europe is much lower than US. Secondly. 2) Most biological effects of RF exposure cannot be sensed by human beings. Examples are the onset of cancer, DNA damage, and fertility

	<p>effects. One category of effects that can often be sensed includes neurological effects on sleep, memory, learning, and behavior. 3) Unborn and very young children may be more affected by RF exposure than adults</p>
<p>Response: ICES have extensively studied the literature for electromagnetic radiation "health effects". The current database consists of 3943 papers. Most of the report by Dr. Ron Powell refers to <i>The BioInitiative Report</i> which has been not been accepted by most expert panels that reviewed it, world-wide.</p> <p>Also, please also note the response by COMAR listed in the above reference:  <a href="https://journals.lww.com/health-physics/pages/articleviewer.aspx?year=2009&amp;issue=10000&amp;article=00008&amp;type=Fulltext">https://journals.lww.com/health-physics/pages/articleviewer.aspx?year=2009&amp;issue=10000&amp;article=00008&amp;type=Fulltext</a></p>	
<p>Iris Lin (YungChing Lin) &amp; Meng-Ju Wu</p>	<p>4. In the Safety Report, the %MPE at 16' above ground level is 17.5% of maximum percent MPE. The %MPE at 6' above ground level is 9.1% of maximum percent MPE. What is the %MPE at 2nd floor bedroom adjacent to the antenna assuming the setback is 40 feet?</p>
<p>Response: Based on a 30' mounting height, which the above values are based on, the value would be 3.805% MPE (general public). These theoretical predictions are extremely conservative in nature and actual measured field values will be below the values calculated above.</p>	
<p>Iris Lin (YungChing Lin) &amp; Meng-Ju Wu</p>	<p>5. We know the closer to the antenna, the stronger the radiation is. The AT&amp;T crew and WMLP staff has safety training and protective equipment while working close to antenna. What's the extent of MPE noncompliance zones of exposure that adjacent homeowner should be aware of? What's the safety procedure if they need to work within that zone, such as tree trimming?</p>
<p>Response: The Occupational Safety and Health Administration (OSHA) sets "Minimum Clearance Distances" for <b>Power line safety (up to 350 kV)--equipment operations in</b> Standard Number: 1926.1408 at 10 feet Source: e-CFR. Based on my theoretical predictions and actual field measurements, 10 feet is more than an adequate distance to prevent exposure above the limits for members of the public. Note that this is the radial distance to the antenna and from not the base of the pole.</p>	
<p>Kristin Lee</p>	<p>2. Question: Few studies have been able to accurately measure exposure to magnetic field nonionizing radiation. Due to the current lack of research on this subject, we don't know the biological threshold beyond which problems may develop, and we also don't yet understand the possible mechanisms for increased risks. How do you account for the lack of research and evidence proving safety, and your decision to move forward with the installation of 42 small cell towers in close proximity to schools and homes? Study: <a href="https://www.sciencedaily.com/releases/2017/12/171213095534.htm">https://www.sciencedaily.com/releases/2017/12/171213095534.htm</a> Article: <a href="https://www.cancer.gov/about-cancer/causesprevention/risk/radiation/electromagnetic-fields-fact-sheet">https://www.cancer.gov/about-cancer/causesprevention/risk/radiation/electromagnetic-fields-fact-sheet</a></p>
<p>Response: I disagree with the stated premise that "<i>Few studies have been able to accurately measure exposure to magnetic field nonionizing radiation</i>". There have been countless valid measurements made of actual field values; the only difficulty is in choosing the correct instrumentation and having the skills necessary to collect accurate values. Unfortunately the hyperlink provided does not work. but assuming <a href="https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet">https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet</a></p>	

[was the link intended](#), the fact-sheet located there notes: *In 2015, the European Commission Scientific Committee on Emerging and Newly Identified Health Risks concluded that, overall, the epidemiologic studies on cell phone radiofrequency electromagnetic radiation exposure do not show an increased risk of brain tumors or of other cancers of the head and neck region). The Committee also stated that epidemiologic studies do not indicate increased risk for other malignant diseases, including childhood cancer.*

Newell,  
Donald

4. When considering the MPE of RF radiation, what safety studies have been performed that account for RF radiation emitted by all cellular antennas combined, including traditional cell towers, macro tower , DAS nodes, proposed small cell wireless facilities? For example, if a DAS node is placed in close proximity to a small cell wireless facility, is the combined exposure taken into account and if so, at what above ground level (AGL) heights?

Response: This is an excellent observation and the FCC addresses this as follows in their “new Rules” which were originally going to go into effect June 1, 2020:  
*(5)(i) In general, when the exposure limits specified in Section 1.1310 are exceeded in an accessible area due to the emissions from multiple fixed RF sources, actions necessary to bring the area into compliance or preparation of an Environmental Assessment (EA) as specified in Section 1.1311 are the shared responsibility of all licensees whose RF sources produce, at the area in question, levels that exceed 5% of the applicable exposure limit proportional to power. However, a licensee demonstrating that its facility was not the most recently modified or newly-constructed facility at the site establishes a rebuttable presumption that such licensee should not be liable in an enforcement proceeding relating to the period of non-compliance. Field strengths must be squared to be proportional to SAR or power density. Specifically, these compliance requirements apply if the square of the electric or magnetic field strength exposure level applicable to a particular RF source exceeds 5% of the square of the electric or magnetic field strength limit at the area in question where the levels due to multiple fixed RF sources exceed the exposure limit. Site owners and managers are expected to allow applicants and licensees to take reasonable steps to comply with the requirements contained in Section 1.1307(b)(1) and, where feasible, should encourage co-location of RF sources and common solutions for controlling access to areas where the RF exposure limits contained in Section 1.1310 might be exceeded. Applicants and licensees are required to share technical information necessary to ensure joint compliance with the exposure limits, including informing other licensees at a site in question of evaluations indicating possible non-compliance with the exposure limits.*

ET Docket No. 19-226

RESOLUTION OF NOTICE OF INQUIRY, SECOND REPORT AND ORDER, NOTICE OF PROPOSED RULEMAKING, AND MEMORANDUM OPINION AND ORDER

Adopted: November 27, 2019 Released: December 4, 2019

Newell,  
Donald

7. Will the town consider retaining an outside expert to perform independent and impartial performance and safety testing of the various antennas that are planned to be used for these small cell installations? In combination with AT&T's safety reports already conducted, such testing would help further inform and ensure safe setback guidelines

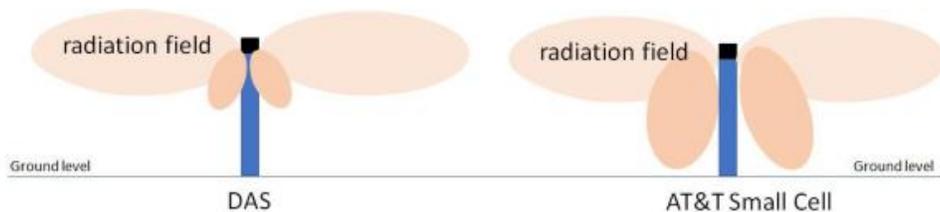
Response: I have the equipment and skills necessary to perform actual field measurements if the Town chooses to do so. To accurately measure field strengths from individual Personal Wireless Services (PWS) providers, an expensive spectrum analyzer with broadband antenna must be used.

Kristin Lee

1. Question: A recent study from Kaiser Permanente provides evidence from a human population that magnetic field non-ionizing radiation could have adverse biological

impacts on human health. How do you plan to consider and protect women's health and reproductive outcomes given the current evidence that it is possible for non-ionizing radiation to have harmful effects for this population? Study: <https://www.nature.com/articles/s41598-017-16623-8> Article: <https://about.kaiserpermanente.org/our-story/health-research/news/newkaiser-permanente-study-provides-evidence-of-health-risks-li>

Response: There is some confusion here between sources of electromagnetic radiation and the literature. I am familiar with this reference source and it refers to magnetic fields associated with 60 Hz magnetic fields, and NOT emissions with PWS facilities, which are much higher in frequency. Sources of 60 Hz fields includes ordinary household electricity and wiring, and typical appliances which plug into the walls of our homes and businesses.



Preliminary Analysis and Additional Information: 1) The antenna in AT&T system has a significant amount of vertical radiation toward ground level that increase the exposure of residents in the surrounding neighborhood while the existing DAS uses an antenna which mainly radiate in the horizontal plane with small vertical radiation. The graph below visualizes the difference of radiation patterns between these two systems.

Response: The actual antenna “radiation patterns” were submitted with AT&T's response to the Town's request for proposals and which I took into account in my emissions reports and are different than the depiction above. My original evaluation of the 2012 DAS system of antennas mounted on utility poles at a centerline height of 34 feet above ground level (AGL), including associated radio equipment found the system would be compliant at that time. I can confirm that that AT&T's proposed small cell facilities will fully comply with the FCC standards and within the exposure limits.

2) The table below used the data provided by WMLP to compare the radio frequency (RF) density between DAS and AT&T system, and it shows the new antenna has a much greater impact on the surround areas. The maximum permissible exposure (MPE) defined by FCC is 10,000 mW/m<sup>2</sup> while Switzerland's MPE is 100 mW/m<sup>2</sup> and Germany's MPE is 10 mW/m<sup>2</sup>.

Antenna Types	Maximum RF density at 6' above ground level (pedestrian level)	Maximum RF density at 16' above ground level (second-floor level)
<a href="#">DAS</a>	35.7 mW/m <sup>2</sup> (0.357% of MPE)	100 mW/m <sup>2</sup> (~1%)
Proposal 1	900 mW/m <sup>2</sup> (9.0%)	1720 mW/m <sup>2</sup> (17.2%)
Proposal 2	910 mW/m <sup>2</sup> (9.1%)	1750 mW/m <sup>2</sup> (17.5%)

Proposal 1: ATT\_06869F\_R01\_Wellesley MA\_v1 Safety 2.pdf

Proposal 2: ATT\_Wellesley MA\_01\_v1 Health 3.pdf

Response: Please refer to RESPONSE immediately above.

3) Although the WMLP's report does not include the maximum RF density at the antenna level, RF emissions could potentially exceed FCC limits when working close to antenna. Hence, this is a serious safety hazard for unaware publics and contractors who work close to the proposed antenna. Hence, a comprehensive safety study should be performed by a Radiation Safety Specialist, and all Wellesley should be notified.

Response: The FCC's guidelines and limits refer to accessible areas; that is areas where personnel are expected to travel. From FCC's document **Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, OET Bulletin 65, Edition 97-01 August 1997**: *Another important point to remember concerning the FCC's exposure guidelines is that they constitute exposure limits (not emission limits), and they are relevant only to locations that are accessible to workers or members of the public.* Obviously, the antennas are not accessible to the general public. Workers are covered by OSHA; see my response above concerning OSHA rules when working near energized power lines.

4) This WHO document lists the typical maximum exposure from cellular base station mounted on a 50 meters tower, and the value is 10mW/m<sup>2</sup>. The RF emissions of the proposed AT&T system within 50 feet is about 90 times higher than the cellular base tower in theory when standing adjacent to the utility pole with antenna on top. Within 300 feet, the RF emissions of AT&T system could still reach 50 mW/m<sup>2</sup> (0.5% of MPE) theoretically. Although the RF density is within the FCC's standard, it creates health concerns when the Small Cell is installed in the residential and school areas. It does not meet the goal of using low power Small Cell to replace high power cellular tower, either.

Response: Dr. Foster's mention of *Typical Maximum Exposure from Cellular Base Station Mounted on 50 m tower (assuming a total effective radiated power of 2500 watts in each sector, summed over all channels)* refer to "typical" 150' AGL "Macro-Cells" and in no way represent values associated with any other PWS installations such as roof-top, in-building, Small Cells, or Micro-Cells. Any comparison made to the contrary would be inappropriate and inaccurate.

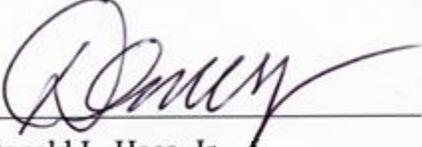
5) Small Cell creates a much greater impact on residents. Cities have created guidelines for Small Cell. For example, Burlington, MA, Cambridge MA, Motley MI, Burlington IA, explicitly mentioned that residential areas, parks, and historic districts are least

preferable locations for Small Cell. Nearby towns, Melford, MA, Marlborough, MA, and Burlington, MA, also have policy for Small Cells installation. For example, after Verizon submitted Small Cell applications, Burlington formed a Small Cell Committee to create a policy and found that the Verizon's proposal didn't meet the town's public interests. Finally, Verizon withdrew the applications.

Response: To the extent that the proposed PWS facility complies with the FCC's exposure limits, there is no greater or lesser "impact" based solely on anticipated or actual exposure levels. The local regulation of PWS facilities are legal issues and I refer you to the FCC's Order with respect to small cell facilities.

I can assure the residents of Wellesley that AT&T's small cell facilities, as proposed, will comply with the applicable FCC limits relating to exposure to radio frequency emissions.

Sincerely,



Donald L. Haes, Jr.  
*Certified Health Physicist*

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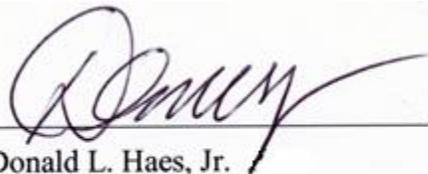
Email: donald\_haes\_chp@comcast.net

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## **STATEMENT OF CERTIFICATION**

1. I certify to the best of my knowledge and belief, the statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions and conclusions.
3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.
4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the cause of the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.
5. This assignment was not based on a requested minimum environmental energy level or specific power density.
6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.
7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.
8. My analyses, opinions, and conclusions were developed and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: June 23, 2020



Donald L. Haes, Jr.

*Certified Health Physicist*