Tesla's Wireless Power Transmitter and the Tunguska Explosion of 1908

Oliver Nichelson

The French ship *Iena* blew up in 1907. Electrical experts were sought by the press for an explanation. Many thought the explosion was caused by an electrical spark and the discussion was about the origin of the ignition. Lee De Forest, inventor of the Audion vacuum tube adopted by many radio broadcasters, pointed out that Nikola Tesla had experimented with a "dirigible torpedo" capable of delivering such destructive power to a ship through remote control. He noted, though, Tesla also claimed that the same technology used for remotely controlling vehicles also could project an electrical wave of "sufficient intensity to cause a spark in a ship's magazine and explode it." [1]

In the summer of 1913, Signor Giulio Ulivi, blew up a gas meter with his "F-Ray" device and destroyed his laboratory. Then, in August of that year, exploded three mines in the port of Trouville for a number of high ranking French naval officers. The following November, he travelled to Splezzia, Italy to repeat the experiments on several old ships and torpedo boats for that country's navy.[2]

In the Spring of 1924 newspapers carried several stories about "death rays" inventions in different parts of the world. The work of Harry Grindell-Matthews, London, was the first reported. The *New York Times* of May 21st had this one:

> Paris, May 20 - If confidence of Grindell Matthews, inventor of the so-called ' diabolical ray,' in his discovery is justified it may become possible to put the whole of an enemy army out of action, destroy any force of airplanes attacking a city or paralyze any fleet venturing within a certain distance of the coast by invisible rays. So much the inventor consented to tell The New York Times correspondent today while continuing to refuse to divulge the exact nature of the rays beyond that they are used to direct an electric current able to perform the program just mentioned.[3]

Grindell-Matthews stated that his destructive rays would operate over a distance of four miles and that the maximum distance for this type of weapon would be seven or eight miles. Asked if it would be possible to destroy an approaching enemy fleet, the inventor said it would not, because "Ships, like land, are in continual contact with the earth, but what I can do is to put the ships out of action by the destruction of vital parts of the machinery, and also by putting the crews temporarily out of action through shock."[4] Airplanes, on the other hand, could be completely destroyed. As soon as his ray touched the plane it would burst into flames and fall to earth.

Grindell-Matthews asserted, "I am convinced the Germans possess the ray." He believed, though, they were carrying out their experiments with high frequencies and at high power, around 200

kilowatts, and could not control the weapon to hit a specific target. So far, said Grindell-Matthews, he had tried tests at 500 watts in his laboratory over a distance of sixty-four feet.

A French company, the Great Rhone Engineering Works of Lyon, had offered Grindell-Matthews extensive financial backing that would allow him to test his device at much higher power levels. He replied that would not undertake such tests "except under conditions of absolute safety on a wide tract of uninhabited land," such was the destructive power of his rays.

Details of the "diabolical rays'" destructive power surfaced that August. "Tests have been reported where the ray has been used to stop the operation of automobiles by arresting the action of the magnetos, and an quantity of gunpowder is said to have been exploded by playing the beams on it from a distance of thirty-six feet."[5] Grindell-Matthews was able, also, to electrocute mice, shrivel plants, and light the wick of an oil lamp from the same distance away.[6]

His own laboratory assistants were themselves became unintentional victims of the ray. When crossing its path during tests they were either knocked unconscious by violent electrical shocks or received intense burns. The inventor stated that though it would be possible to kill enemy infantry with the ray, "it would be quite easy to graduate the electric power used so that hostile troops would only be knocked out long enough to effect their capture."[7]

On May 25th, a second death ray was announced in England. Doctor T.F. Wall, a "lecturer in electrical research in Sheffield University, "applied for a patent for means of transmitting electrical energy in any direction without the use of wires. According to one report. even though he has not made tests on a large scale yet "Dr. Wall expressed the belief that his invention would be capable of destroying life, stopping airplanes in flight and bringing motor cars to a standstill." On a more positive note, he added that his invention would have beneficial applications in surgical and medical operations.[8]

Germany joined the technology race on May 25th when it announced its electrical weapon. As the *Chicago Tribune* reported:

> Berlin - That the German Government has an invention of death rays that will bring down airplanes, halt tanks on the battlefields, ruin automobile motors, and spread a curtain of death like the gas clouds of the recent war was the information given to Reichstag members by Herr Wulle, chief of the militarists in that body. It is learned that three inventions have been perfected in Germany for the same purpose and have been patented.

Sensing something of importance the *New York Times* copyrighted its story of May 28th on a ray weapon developed by the Soviets. The story opened: "News has leaked out from the Communist circles in Moscow that behind Trotsky's recent war-like utterance lies an electromagnetic invention, by a Russian engineer named Grammachikoff for destroying airplanes."[9]

Tests of the destructive ray, the *Times* continued, had began the previous August with the aid of German technical experts. A large scale demonstration at Podosinsky Aerodome near Moscow was so

successful that the revolutionary Military Council and the Political Bureau decided to fund enough electronic anti-aircraft stations to protect sensitive areas of Russia. Similar, but more powerful, stations were to be constructed to disable the electrical mechanisms of warships. The Commander of the Soviet Air Services, Rosenholtz, was so overwhelmed by the ray weapon demonstration that he proposed "to curtail the activity of the air fleet, because the invention rendered a large air fleet unnecessary for the purpose of defense."

An English engineer, J.H. Hamil, offered the American army plans for producing " an invisible ray capable of stopping airplanes and automobiles in midflight," invented by a German scientist. The ray device was said to have been used the previous summer to bring down French planes over Bavaria. Hamil noted, however, that "the fundamental work was done by Nikola Tesla in Colorado Springs about 30 years ago. He built a powerful electrical coil. It was found that the dynamos and other electrical apparatus of a Colorado fuel company within a 100 yards or so were all put out of business.[10]

Hamil believed the Tesla coil scattered rays which short- circuited electrical machinery at close range. Laboratories all over the world, he added, were testing methods of stepping up the Tesla coil to produce its effects at greater distances. "Working on an entirely different principle," Hamil said, "the German scientist has succeeded in projecting and directing electrical power."

Those Colorado Springs tests carried out by Tesla were well remembered by local residents. With a 200 foot pole topped by a large copper sphere rising above his laboratory he generated potentials that discharged lightning bolts up to 135 feet long. Thunder from the released energy could be heard 15 miles away in Cripple Creek. People walking along the streets were amazed to see sparks jumping between their feet and the ground, and flames of electricity would spring from a tap when anyone turned them on for a drink of water. Light bulbs within 100 feet of the experimental tower glowed when they were turned off. Horses at the livery stable received shocks through their metal shoes and bolted from the stalls. Even insects were affected: Butterflies became electrified and "helplessly swirled in circles - their wings spouting blue halos of 'St. Elmo's Fire.'"[11]

The effect that captured the attention of foreign death ray inventors occurred at the Colorado Springs Electric Company powerhouse. One day while Tesla was conducting a high power test, the crackling from inside the laboratory suddenly stopped. Bursting into the lab Tesla demanded to know why his assistant had disconnected the coil. The assistant protested that had not done anything. The power from the city's generator, the assistant said, must have quit. When the angry Tesla telephoned the power company he received an equally angry reply that the power company had not cut the power, but that Tesla's experiment had destroyed the generator!

The inventor explained to *The Electrical Experimenter,* in August of 1917 what had happened.

> As an example of what has been done with several hundred kilowatts of high frequency energy liberated, it was found that the dynamos in a power house six miles away were repeatedly burned out, due to the powerful high frequency currents set up in them, and which caused heavy sparks to jump thru the windings and destroy the insulation! The

> lightning arresters in the power house showed a stream of blue-white sparks passing between the metal plates to the earth connection.[12]

When questioned about the Ulivi ray that created so much comment a few years earlier, Tesla asserted, in the same interview, that "it was transplanted from this country to Italy." He saw it as simply a modification of his ultra-powerful high frequency coil tested in Colorado. With thousands of horsepower[1] of energy "it would become readily possible to detonate powder and munition magazines by means of the high frequency currents induced in every bit of metal, even when located five to six miles away or more."

With others attributing an energy weapons technology to Tesla's wireless power transmission research, his comments on the destructive capabilities of his system take on a great deal of importance. Writing tersely for *Liberty* magazine of February 1935 he stated:

> My invention requires a large plant, but once it is established it will be possible to destroy anything, men or machines, approaching within a radius of 200 miles. It will, so to speak, provide a wall of power offering an insuperable obstacle against any effective aggression.[13]

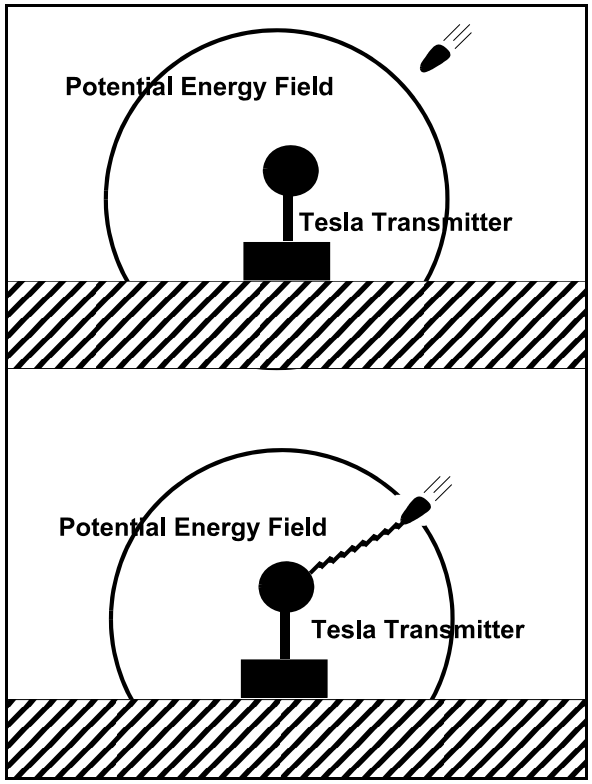
He went on to make a distinction between his invention and those brought forward by others. He claimed that his device did not use any so-called "death rays" because such radiation cannot be produced in large amounts and rapidly become weaker over distance. He likely was making reference to a Grindell-Matthews type of device that, according to contemporary reports, used a powerful ultra-violet beam to make the air conducting so that high energy current could be directed to the target. The range of an ultra-violet searchlight would be much less than what Tesla was claiming. As he put it: "all the energy of New York City (approximately two million horsepower [1.5 billion watts]) transformed into rays and projected twenty miles, would not kill a human being."

Not wanting to give away a potentially valuable creation in an interview, he was intentionally opaque concerning the details of his design. He did clarify how his design differed from the ray type of devices.

> My apparatus projects particles which may be relatively large or of microscopic dimensions, enabling us to convey to a small area at a great distance trillions of times more energy than is possible with rays of any kind. Many thousands of horsepower can be thus transmitted by a stream thinner than a hair, so that nothing can resist.

[1]One horsepower equals 745.7 watts.

If Tesla's energy weapon cannot be called a "ray" device, but as one projecting microscopic particles, it would seem that it had to differ from the other designs in one of two ways. Either he was making the distinction between a beam of radiant energy, like a beam from a flashlight that has billions of energy carrying photons, and his own with all of its energy concentrated into a stream a single particle wide, or he was making a distinction about the size of the beam and the method it is used to reach the target.



Tesla particle beam system - possible configuration

In a Grindell-Matthews type of beam, the flashlight model, a huge number of high energy particles or photons would have to be sent out from the system so that a large enough area on the target would be covered in order to disable it. What Tesla seems to have intended was that his energy transmitter would set up a field of force around itself which, when penetrated, would release its energy directly to the target. The effect would be like sending a current of particles through a wire directly to the target. A large area on the target would not have to be "painted" by a beam, so the current reaching the intruder could be very thin and deliver a great deal of energy to a small area.

The Colorado tests that gave rise to the variety of "death ray" inventions in the U.S. and Europe may have lead to the development of a much more powerful weapon.

When Tesla realized that economic forces would not allow the development of a new type of electrical generator that would supply power without burning fuel he "was led to recognize [that] the transmission of electrical energy to any distance through the media as by far the best solution of the great problem of harnessing the sun's energy for the use of man."[14,15] His idea was that a relatively few generating plants located near waterfalls would supply his very high energy transmitters which, in turn, would send power through the earth to be picked up wherever it was needed.

Receiving energy from this high pressure reservoir only would require a person to put a rod into the ground and connect it to a receiver operating in resonance with the electrical motion in the earth. As Tesla described in 1911, "The entire apparatus for lighting the average country dwelling will contain no moving parts whatever, and could be readily carried about in a small valise."[16]

The difference between a current used to "light the average country dwelling" and a current used as a method of destruction, however, is a matter of timing. If the amount of electricity used to run a

television for an hour is released in a millionth of a second, it would have a very different, and negative, effect on the television.

Tesla said his transmitter could produce 100 million volts of pressure and currents up to 1000 amperes, with experimental power levels of billion or tens of billions of watts.[17] If that amount of power were released in "an incomparably small interval of time,"[18] the energy would be equal to the explosion of millions of tons of TNT, that is, a multi-megaton explosion. Such a transmitter would be capable of projecting the force of a nuclear warhead by radio. Any location in the world could be vaporized at the speed of light.

Not unexpectedly, many scientists doubted the technical feasibility of Tesla's wireless power transmission scheme whether for commercial or military purposes. Modern authorities in electronics, even those who express admiration for the Tesla's genius, believe he was mistaken in the interpretation of his experiments when it came to electrical transmission through the earth.[19,20,21]

On the other hand, statements from authoritative witnesses who saw Tesla's equipment in operation support his claim about transmission with something other than the radio waves known today. During the Chicago World's Fair of 1893, the Westinghouse exhibit set up by Tesla was visited by the Herman von Helmholtz, the first director of the Physico-Technical Institute of Berlin and one of the leading scientists of his time. When Tesla "asked the celebrated physicist for an expression of opinion on the feasibility of the [transmission] scheme. He stated unhesitatingly that it was practicable."[22] In 1897, Lord Kelvin visited New York and stopped at the Tesla laboratory where Tesla "entertained him with demonstrations in support of my wireless theory."

> Suddenly [Kelvin] remarked with evident astonishment: 'Then you are not making use of Hertz waves?' 'Certainly not', I replied, '*these are radiations*.' ... I can never forget the magic change that came over the illustrious philosopher the moment he freed himself from that erroneous impression. The skeptic who would not believe was suddenly transformed into the warmest of supporters. He parted from me not only thoroly convinced of the scientific soundness of the idea but strongly exprest his confidence in its success.[23]

A recent analysis of Tesla's wireless transmission method shows that he used an electrostatic transmission technique that did not radiate radio waves as we know them and could sent waves through the earth with little loss of power.[24] The question remains of whether Tesla demonstrated the weapons application of his power transmission system. Circumstantial evidence found in the chronology of Tesla's work and financial fortunes between 1900 and 1908 points to there having been a test of this weapon.

1900: Tesla returned to New York from Colorado Springs after completing the tests of wireless power transmission that destroyed the power company's generator. He received $150,000 from J.P. Morgan to build a transmitter to signal Europe. With the first portion of the money he obtained 200 acres of land at Shoreham, Long Island and built an 187 foot tall tower with a steel shaft running 120 feet into the

ground. This tower was topped with a 55 ton, 68 foot diameter metal dome. He called the research site "Wardenclyffe" and envisioned 2000 people eventually working at his global communications center.

A stock offering is made by the Marconi company. Supporters of the Marconi Company include his old adversary Edison and one-time associate Michael Pupin. Investors rushed to buy the Marconi shares. On December 12th, Marconi sent the first transatlantic signal, the letter "S," from Cornwall, England to Newfoundland, Canada. He did this with, as the financiers noted, equipment much less costly than that being built by Tesla.

1902: The Wardenclyffe transmitter nears completion. Marconi is hailed as a hero around the world while Tesla is seen as a shirker by the public for ignoring a call to jury duty in a murder case (he was excused from duty because of his opposition to the death penalty).

1903: When Morgan sent the balance of the $150,000, it would not cover the outstanding balance Tesla owed on the Wardenclyffe construction. To encourage a larger investment in the face of Marconi's success, Tesla revealed to Morgan his real purpose was not to just send radio signals but the wireless transmission of power to any point on the planet. Morgan was uninterested and declined to provide further funding.

A financial panic that Fall put an end to Tesla's hopes for financing by Morgan or other wealthy industrialists. This left Tesla without money even to buy the coal to fire the transmitter's electrical generators.

1904 - 1906: Tesla writes for the *Electrical World*, "The Transmission of Electrical Energy Without Wires," noting that the globe, even with its great size, responds to electrical currents like a small metal ball.

Tesla declares to the press the completion of Wardenclyffe. Marconi is hailed as a world hero.

Tesla subject to multiple law suits over unpaid Colorado Springs expenses. George Westinghouse, who bought Tesla's patents for alternating current motors and generators in the 1880's, turns down the inventor's power transmission business proposal. Workers gradually stop coming to the Wardenclyffe laboratory when there are no funds to pay them. In an article, Tesla comments on Peary's expedition to the North Pole and tells of his, Tesla's, plans for energy transmission to any central point on the ground.

1907: When commenting on the destruction of the French ship *Iena,* Tesla noted in a letter to the *New York Times* that he has built and tested dirigible torpedoes (remotely controlled torpedoes), but that electrical waves would be more destructive. "As to projecting wave energy to any particular region of the globe ... this can be done by my devices," he wrote. Further, he claimed that "the spot at which the desired effect is to be produced can be calculated very closely, assuming the accepted terrestrial measurements to be correct."[25]

1908: Tesla repeated the idea of destruction by electrical waves to the newspaper on April 21st. His letter to the editor stated, "When I spoke of future warfare I meant that it should be conducted by direct application of electrical waves without the use of aerial engines or other implements of destruction." He added: "This is not a dream. Even now wireless power plants could be constructed by which any region of the globe might be rendered uninhabitable without subjecting the population of other parts to serious danger or inconvenience."[26]

In the period from 1900 to 1910 Tesla's creative thrust was to establish his plan for wireless transmission of energy. Undercut by Marconi's accomplishment, beset by financial problems, and spurned by the scientific establishment, Tesla was in a desperate situation by mid-decade. The strain became too great by 1906-1907 and, according to Tesla biographers, he suffered an emotional collapse.[27,28] In order to make a final effort to have his grand scheme recognized, he may have tried one high power test of his transmitter to show off its destructive potential. This would have been in 1908.

The Tunguska event took place on the morning of June 30th, 1908. An explosion estimated to be equivalent to 10-15 megatons of TNT flattened 500,000 acres of pine forest near the Stony Tunguska River in central Siberia. Whole herds of reindeer were destroyed. Several nomadic villages were reported to have vanished. The explosion was heard over a radius of 620 miles. When an expedition was made to the area in 1927 to find evidence of the meteorite presumed to have caused the blast, no impact crater was found. When the ground was drilled for pieces of nickel, iron, or stone, the main constituents of meteorites, none were found down to a depth of 118 feet.

Several explanations have been given for the Tunguska event. The officially accepted version is that a 100,000 ton fragment of Encke's Comet, composed mainly of dust and ice, entered the atmosphere at 62,000 mph, heated up, and exploded over the earth's surface creating a fireball and shock wave but no crater. Alternative explanations of the disaster include a renegade mini-black hole or an alien space ship crashing into the earth with the resulting release of energy.

Associating Tesla with the Tunguska event comes close to putting the inventor's power transmission idea in the same speculative category as ancient astronauts. However, historical facts point to the possibility that this event was caused by a test firing of Tesla's energy weapon.

In 1907 and 1908, Tesla wrote about the destructive effects of his energy transmitter. His Wardenclyffe facility was much larger than the Colorado Springs device that destroyed the power station's generator. Then, in 1915, he stated bluntly:

> **It is perfectly practical to transmit electrical energy without wires and produce destructive effects at a distance. I have already constructed a wireless transmitter which makes this possible. ... But when unavoidable [it] may be used to destroy property and life.** The art is already so far developed that the great destructive effects can be produced at any point on the globe, defined beforehand with great accuracy (emphasis added).[29]

Wardenclyffe

He seems to confess to such a test having taken place before 1915, and, though the evidence is circumstantial, Tesla had the motive and the means to cause the Tunguska event. His transmitter could generate energy levels and frequencies capable of releasing the destructive force of 10 megatons, or more, of TNT. And the overlooked genius was desperate.

The nature of the Tunguska event, also, is consistent with what would happen during the sudden release of wireless power. No fiery object was reported in the skies at that time by professional or amateur astronomers as would be expected when a 200,000,000 pound object enters the atmosphere at tens of thousands miles an hour. Also, the first reporters, from the town of Tomsk, to reach the area judged the stories about a body falling from the sky was the result of the imagination of an impressionable people. He noted there was considerable noise coming from the explosion, but no stones fell. The absence of an impact crater can be explained by there having been no material body to impact. An explosion caused by broadcast power would not leave a crater.

In contrast to the ice comet collision theory, reports of upper atmosphere and magnetic disturbances coming from other parts of the world at the time of and just after the Tunguska event point to massive changes in earth's electrical condition. Baxter and Atkins cite in their study of the explosion, *The Fire Came By*, that the *Times* of London editorialized about "slight, but plainly marked, disturbances of ... magnets," which the writer, not knowing then of the explosion, associated with solar prominences.[30]

In Berlin, the New York *Times* of July 3rd reported unusual colors in the evening skies thought to be Northern Lights: "Remarkable lights were observed in the northern heavens ... bright diffused white and yellow illumination continuing through the night until it disappears at dawn."[31] Massive glowing "silvery clouds" covered Siberia and northern Europe. A scientist in Holland told of an "undulating mass" moving across the northwest horizon. It seemed to him not to be a cloud, but the "sky itself seemed to undulate." A woman north of London wrote the London *Times* that on midnight of July 1st the sky glowed so brightly it was possible to read large print inside her house. A meteorological observer in England recounted on the nights of June 30th and July 1st:

> A strong orange yellow light became visible in the north and northeast... causing an undue prolongation of twilight lasting to daybreak on July 1st...There was a complete absence of scintillation or flickering, and no tendency for the formation of streamers, or a luminous arch, characteristic of auroral phenomena...Twilight on both of these night was prolonged to daybreak, and there was no real darkness.[32]

The report that most closely ties these strange cosmic happenings with Tesla's power transmission scheme is that while the sky was aglow with this eerie light it was possible to clearly see ships at sea for miles in the middle of the night.[33] Tesla specifically claimed this as one of the effects he could achieve with his high power transmitter. Of particular importance is that none of his claims for lighting the ocean appeared before 1908.[34]

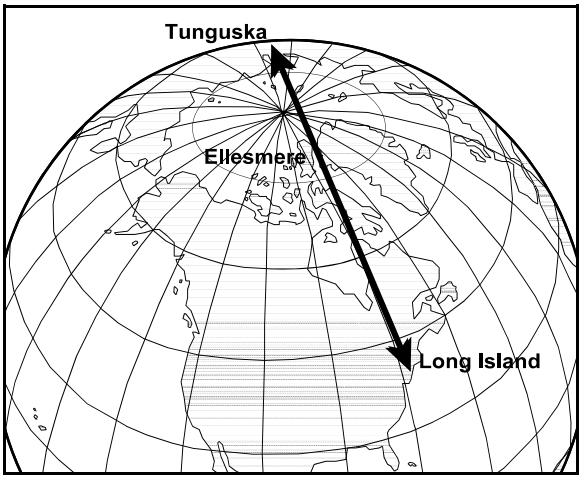
A typical statement about the light induced by his transmitter is this from the New York *American* of December 7th, 1914:

> The lighting of the ocean ... is only one of the less important results to be achieved by the use of this invention [the transmitter]. I have planned many of the details of a plant which might be erected at the Azores and which would be amply sufficient to illuminate the entire ocean so that such a disaster as that of the Titanic would not be repeated. The light would be soft and of very small intensity, but quite adequate to the purpose.[35]

When Tesla used his high power transmitter as a directed energy weapon he drastically altered the normal electrical condition of the earth. By making the electrical charge of the planet vibrate in tune with his transmitter he was able to build up electric fields that effected compasses and caused the upper atmosphere to behave like the gas filled lamps in his laboratory. He had turned the entire globe into a simple electrical component that he could control.

Given Tesla's general pacifistic nature it is hard to understand why he would carry out a test harmful to both animals and the people who herded the animals even when he was in the grip of financial desperation. The answer is that he probably intended no harm, but was aiming for a publicity coup and, literally, missed his target.

At the end of 1908, the whole world was following the daring attempt of Peary to reach the North Pole which he claimed in the Spring of 1909. If Tesla wanted the attention of the international press, few things would have been more impressive than the Peary expedition sending out word of a cataclysmic explosion on the ice near or at the North Pole.[36] Tesla, then, if he could not be hailed as the master creator that he was, could be seen as the master of a mysterious new force of destruction.



Magnifying Transmitter's Test Path

The test, it seems, was not a complete success. It must have been difficult controlling the vast amount

of power in transmitter to the exact spot Tesla intended. The North Pole lies close to a great circle line connecting Shoreham, Long Island and the Tunguska region. That path passes close by Alert on Ellesmere Island where Peary spent the winter.[37] The uninhabited region between Alert and the North Pole might have been the intended target for a test firing of the wireless transmission system. However, "the accepted terrestrial measurements" of that day were not precise enough for the task. The destructive electrical wave overshot its target.

Whoever was privy to Tesla's energy weapon demonstration must have been dismayed either because it missed the intended target and would be a threat to inhabited regions of the planet, or because it worked too well in devastating such a large area at the mere throwing of a switch thousands of miles away. Whatever was the case, Tesla never received the notoriety he sought for his power transmitter.

The evidence is only circumstantial. Perhaps Tesla never did achieve wireless power transmission through the earth. Maybe he made a mistake in interpreting the results of his radio tests in Colorado Springs and really saw a low frequency phenomenon, Schumann oscillations, and not an effect engineers believe a scientific impossibility. Perhaps the mental stress he suffered caused him to retreat into a fantasy world from which he would send out preposterous claims to reporters who gathered for his yearly pronouncements on his birthday. Maybe the atomic bomb size explosion in Siberia near the turn of the century was the result of a meteorite nobody saw fall.

Or, perhaps, Nikola Tesla did shake the world in a way that has been kept secret for almost 100 years.

Notes

1. *New York Times*, "Wireless Caused Iena Disaster?", Mar. 19, 1907, p. 4, col. 4.

2. *New York Times*, "Signor Ulivi First Blew Up Gas Meter," Nov. 2, 1913, III, p. 4, col. 5.

3. *New York Times*, "Tells Death Power of 'Diabolical Rays'," May 21, 1924, pg.1.

4. Note 3.

5. *Popular Mechanics*, "'Death Ray' Is Carried by Shafts of Light," Aug. 1924, pgs. 189-192.

6. *Current Opinion*, "A Violet Ray That Kills," June 1924, pgs. 828-829.

7. Note 6.

8. *New York Times*, "Second British Inventor Reveals a Death Ray," May 25, 1924, p. 1, col. 2.

9. *New York Times*, "Suggests Russia Has A 'Ray'," May 28, 1924, pg. 25.

10. *Colorado Springs Gazette*, "Tesla Discovered 'Death Ray' In Experiments Made Here," May 30, 1924, pg. 1.

11. Goldman, Harry L., "Nikola Tesla's Bold Adventure," *The American West*, Mar. 1971, pgs. 4-9; Reprinted by Nick Basura, 3414 Alice St., Los Angeles, Ca. 90065, 1974.

12. Tesla, Nikola, "Famous Scientific Illusions," *Electrical Experimenter*, Feb. 1919, pgs. 692f.

13. Tesla, Nikola, "A Machine to End War," as told to George Sylvester Viereck, *Liberty*, Feb. 1935, p. 5-7.

14. Tesla, Nikola, "The Problem of Increasing Human Energy - Through Use of the Sun's Energy," *The Century Illustrated Magazine*, reprinted in *Lectures, Patents, and Articles*, Nikola Tesla Museum, Belgrade, 1956; reprinted by Health Research (Mokelumme Hill, Calif., 95245), 1973, pg. A-143.

15. Nichelson, Oliver, "Nikola Tesla's Later Energy Generation Designs," IECEC, 1991.

16. *American Examiner*, Copyright 1911, no date, no pg.

17. Tesla, Nikola, *New York Times*, "How to Signal Mars," May 23, 1909, pg. 10. He claims to have sent "a current around the globe " on the order of "15,000,000" horsepower or 11 billion watts.

18. Secor, H. Winfield, "The Tesla High Frequency Oscillator," *The Electrical Experimenter*, March 1916, pg. 615.

19. Wait, James R., "Propagation of ELF Electromagnetic Waves and Project Sanguine/Seafarer," *IEEE Journal of Oceanic Engineering*, vol. OE-2, no. 2, April 1977, pgs. 161-172.

20. Marinic, Aleksandar, *Nikola Tesla, Colorado Springs Notes 1899-1900*, Nikola Tesla Museum, Published by Nolit, Beograd, Yugoslavia, pg.19.

21. Corum, James F., and Corum, Kenneth L., "Disclosures Concerning the Operation of an ELF Oscillator," *Tesla '84: Proceedings of the Tesla Centennial Symposium*, Dr. Elizabeth Rauscher and Mr. Toby Grotz, editors, International Tesla Society, Inc., Colorado Springs, 1985, pgs. 41-49.

22. Tesla, Nikola, "Famous Scientific Illusions," *Electrical Experimenter*, Feb. 1919, pg. 732.

23. Note 22.

24. Nichelson, Oliver, "Tesla's Wireless Transmission Method," 1992.

25. Tesla, Nikola, "Tesla's Wireless Torpedo," *New York Times*, Mar. 20, 1907, pg. 8.

26. Tesla, Nikola, *New York Times*, "Mr. Tesla's Vision," April 21, 1908, pg. 5.

27. Seifer, Marc J., "Nikola Tesla: The Lost Wizard," *Tesla '84: Proceedings of the Tesla Centennial Symposium*, op. cit., pgs. 31-40. Seifer, a psychologist, believes Tesla suffered a nervous breakdown catalyzed by the death of one the partners in the Tesla Electric Company and the shooting of Stanford White, the noted architect, who had designed Wardenclyffe. Seifer places this in 1906 and cites as evidence a letter from George Scherff, Tesla's secretary:

> Wardenclyffe, 4/10/1906
> Dear Mr. Tesla:
>
> I have received your letter and am glad to know you are vanquishing
> your illness. I have scarcely ever seen you so out of sorts
> as last Sunday; and I was frightened.

28. Cheney, Margaret, *Tesla: Man out of Time*, Dell Publishing Co., N.Y., 1983, pg. 187. Cheney sees a mental change taking place about 1907. Having lost most of his money and many of his friends and seeing less talented people praised for achievements based on his inventions "exerted a corrosive and lasting effect on his personality."

29. Tesla, Nikola, "Tesla's New Device Like Bolts of Thor," *New York Times*, Dec. 8, 1915, pg. 8.

30. Baxter, John and Atkins, Thomas, *The Fire Came By*, Warner Books, N.Y., 1977, pg. 27.

31. Note 30, pg. 26.

32. Spenser Russell quoted in Baxter and Atkins, *The Fire Came By*, page 28, from the *Royal Meteorological Society Quarterly*, 1930.

33. Note 30.

34. The earliest mention of lighting the ocean appears to have been in 1911 in a *N.Y. American* article (Sept. 3rd by Marcel Roland). Ratzlaff, John and Anderson, Leland, *Dr. Nikola Tesla Bibliography*, Ragusan Press, 1979, pg. 93.

35. New York *American*, "Tesla Light to Rob Oceans of Every Danger," Dec. 7, 1914, no pg.

36. Tesla suggested a similar test of his power transmission system aimed at the moon where everyone could see "the splash and volitization of matter." See note 19, pg. 255.

37. Bayshore, L.I. is at 40 N 43, 73 W 13; Alert, Canada (Ellesmere Island) 82 N 31, 62 W 05, and Tunguska at 60 N 55, 101 E 57.