

Education: 5 years of credit hours in science/math and liberal arts at Harvard College, Portland State, and the University of Washington

Registration: Professional Engineer, Electrical - State of Washington (1973)
Professional Engineer, Electrical - State of California (1975)

Summary of Experience:

Mr. Dawson is the managing partner and senior engineer of Hatfield & Dawson. He has more than 40 years of experience in the field of electrical engineering and has provided design and inspection services on several hundred medium wave and UHF and VHF broadcasting antenna systems. These projects have included: antenna and radio propagation analysis, site selections, system planning, and field measurements; cellular telephone system design; facility engineering; and site specifications and funding acquisition. In addition, he has developed specifications and design of point-to-point video, data, and voice radio systems at various frequencies. He has also conducted policy analysis and related technical research for communications regulations and technology for private clients and foreign governments. Mr. Dawson routinely provides field inspection of facilities, prepares policy analyses, and conducts related technical research for communications regulations. Additionally, he prepares environmental reports regarding the effects of telecommunications facilities and radio frequency devices.

MW (AM Radio) Experience:

Radiofrequency Energy Exposure Study for VOA MW Stations: Project manager for this study, including preparation of the model safety plan and model measurement plan for IBB/USIA MW transmitter sites.

Kuwait MW Antenna System Electrical Height Analysis: Prepared test plan and supervised measurements of current distribution on site. Responsible for preparation of report outlining conclusions of measurement and analysis process.

Porro MW Antenna Frequency Change: Prepared preliminary design, made all field changes, and supervised measurements to implement frequency change for antenna pattern to allow tests on 1170 kHz.

Porro Allocation Studies for Operation on 1170 kHz and Udorn Medium Wave Radiation Study (Allocation Analysis): Prepared analysis of the allocation conditions based on both national and ITU frequency allotment regulations (Geneva '75 Agreement standards), and prepared report showing allowable radiation for each site on this frequency.

Dong Hoi Vietnam Antenna Diplexing Design and Implementation: Performed inspection of facility, including measurements of transmission line lengths for design of "compromise" feed for two-frequency operation. Prepared initial facility design. Supervised all mechanical installation, and made final modifications for wide-bandwidth operation on both frequencies.

Gufuskular and Eidar, Iceland Loran Antenna Conversion: Prepared preliminary design of conversion of Loran antenna for 300 kW longwave operation and design of new antenna installation. Modified antenna design for new installation when aviation agency required height reduction. Prepared test plan for field tests and commissioning.

Al Arish, Qatar Design and Implementation of 2000 Kilowatt Directional Antenna: Performed all preliminary inspections and prepared antenna design for allocation and service conditions. Prepared specifications for antenna tower procurement and installation.

Kamo Armenia Antenna and Transmitter Analysis for Frequency Change: Performed measurements and analysis to determine feasibility of frequency change, and prepared work plan for successful conversion of eight-tower 1000 Kilowatt antenna.

WDFN Detroit Antenna System Refurbishment: Supervised allocation studies and performed field measurements and adjustments for final tune-up. Prepared license modification to accommodate revised allocation situation.

Liberty 963 London, Facility Study and Improvement Recommendations and Implementation: Reviewed national and international allocation situation, and prepared recommendations for improvement. Modified recommendation after consultation with regulatory agency to allow two-frequency operation. Reviewed antenna system operation and prepared test plan for interim operation, leading to final approval of operation.

KTCT Facility Improvement Planning and Implementation: Prepared analysis of potential coverage improvement. Prepared engineering study and assisted in negotiations with Mexican government and FCC for approval of improved nighttime operation. Designed changes to daytime feed system, supervised modifications, and performed measurement and tune-up of modified antenna.

Port of Seattle: Project Manager for the Port of Seattle project to detune crane structures, including measuring contact currents, predicting shock and burn hazards for various crane configurations, and preparing recommendations of techniques to reduce hazards to Port personnel.

Technical consultant for analysis and preparation of specifications for relocation of a medium wave antenna system near San Diego, CA, for the California Department of Transportation.

Project Manager to investigate the affects of constructing a new freeway overcrossing directly adjacent to the four-tower antenna system of station KSJX in San Jose, CA. Completed an analysis of the network, conducted field strength measurements, and instituted a regular monitoring program.

VHF & UHF (FM Radio & TV):

Project Manager for DirecTV: In 1997 requested that Hatfield & Dawson prepare field strength maps of a television station signal in numerous zip codes well within the FCC method grade A contour. H&D obtained computer databases containing zip code data, and wrote programs to make the zip code data compatible with the mapping feature of signal strength prediction software. The resulting maps demonstrate the areas within each zip code which receive grade B, grade A, and better than grade A service. Significant areas within each zip code did not receive grade B service from the television station. This project required significant software development effort in a very short period of time, since none of the commercially available propagation software vendors provided the necessary programs.

Facility Planning, Ackerley Communications, Portland, OR: As a result of long-standing concern with radiation density levels and with inferior antenna mounting conditions on existing structures at Healy Heights in Portland, Oregon, Ackerley Communications constructed a state-of-the-art communications complex, including a 600-foot self-supporting tower structure and associated equipment building. Hatfield & Dawson selected the site, conducted analysis of necessary structure height, negotiated with the FAA, specified the antenna requirements for both coverage performance and low ground-level radiation, and assisted the client with land use application and negotiation. The project was successful despite initial opposition from well-entrenched (and well-financed) neighbors and competitive antenna space providers.

Specification and Planning, SKY 100.4 FM, Athens, Greece: The heavily mountainous terrain surrounding the city of Athens makes FM coverage of the entire city difficult at best, even at high power. To solve this problem, Ermis Mass Media Corporation engaged the services of Hatfield &

Dawson to perform the specification of antenna and transmitter facilities for two sites for its high power FM station SKY 100.4, serving Athens and the Attica Peninsula. The initial project included inspection of the sites, analysis of signal strength measurements, digitization of topography from printed maps, and propagation analysis. From these data, Hatfield & Dawson prepared detailed specifications for replacement of the existing transmitting facility and for construction of a second facility for coverage of areas shadowed from the first one. Subsequent to the initial studies, we evaluated several transmitter sites for service to other areas of the country, including Salonika, Patros, and the island of Crete. Sites were selected for network interconnection as well as local coverage. Our analysis included computer models of propagation for the main Athens transmitter sites, as well as the site on Santorini Island for coverage of Crete. The unusual propagation conditions of the eastern Mediterranean were modeled for these studies. A complete facility plan was prepared to integrate the existing FM antenna site at Parnitha, north of Athens, along with a complete facility plan for a television transmitting facility. The primary FM site at Imitos also includes a high-power television transmitter, and our project included environmental evaluation of the radiation hazard potential and electromagnetic compatibility (EMC) of the multiple transmitters on this site.

Radio and Television Facilities Planning and Expansion, Republic of Seychelles: The Republic of Seychelles, an island nation in the western Indian Ocean, requested development assistance from the International Telecommunications Union (a United Nations agency) in connection with the expansion of aural and television broadcast services. The U.S. Trade and Development Agency funded the project. Hatfield & Dawson supervised a team of expert technical consultants from Harris Corporation in a comprehensive study of the republic's government-owned broadcast system, operated by Radio-Television Seychelles. The team performed on-site evaluations, including surveys of existing radio and television facilities, as well as inspections of potential new broadcast sites, which would facilitate the expansion of AM and TV service to nearly all inhabited areas and the introduction of FM service to main population centers. Inspections included evaluation of the sites' suitability for integration into a comprehensive network of inter-island microwave links for programming distribution, replacing an inefficient system of off-air repeaters. A conceptual plan for satellite distribution of television service to local retransmission sites was also prepared. Following their on-site evaluations, the team prepared a report of their findings to be used by Radio-Television Seychelles for facilities planning and expansion. This report included the team's analysis of existing facilities, detailed recommendations for expansion and improvement, and cost breakdowns for the various options.

Consulting Services, Radio Exitos Mil Noventa, Venezuela: Hatfield & Dawson has provided expert consulting services on broadcast engineering and regulatory matters to Radio Exitos Mil Noventa,

the eminent Venezuelan broadcasting company, for over ten years. When the Venezuelan Ministry of Communications was formulating new technical regulations for FM broadcasting, we provided expert advice and consulted with the Ministry on behalf of Mil Noventa to ensure that licensing policies and technical regulations were reasonable and appropriate. We also provided a technical seminar on FM propagation and facilities matters for the engineers of the Ministry at the request of the Director General.

Facility Planning, Radio Exitos Mil Noventa, Caracas, and other sites in Venezuela: When the new FM regulations were put into force, we provided specific facility designs for transmitter sites in seven Venezuelan cities. Each site was inspected, alternate sites evaluated, and facility plans prepared. In several cases, signal strength measurements were made of existing television transmitters to evaluate FM coverage performance. These measurements were used to provide validation of computer propagation models. We have continued to provide engineering services to Exitos Mil Noventa, including facility planning and antenna designs for several medium wave antenna systems, including diplexed antennas and antennas with top-loading to allow construction near a major airport. Our services to Mil Noventa also include planning for multiple site synchronized television transmitters for pay-TV service in metropolitan Caracas.

Facility Inspection and Design, AKFN-TV, Seoul, Korea: Inspection of physical facilities and signal strength measurements of the operation of an existing Channel 2 television station, propagation analysis and antenna specification, and preparation of a complete plan for conversion to operation on a higher VHF or a UHF channel. AFKN-TV is a high power television station that operates from a transmitter site at Namsan Mountain (Camp Morse) in central Seoul. The proposed UHF operation would be with one megawatt of power. The project required installation drawings for the complete dual redundant transmitter and all accessories in an existing building, as well as specifications and drawings for the antenna, transmission lines, and AC electrical installation. All required components of the project were specified by manufacturer's name and model. The project required performance on a very short schedule, with commencement ten days after award and completion 60 days thereafter. The sponsoring agency (Television-Audio Support Activity, Engineering Division, Sacramento Army Depot) informed us that this project was the first engineering services contract they had ever let to an outside vendor.

Specification and Design of Antenna System for High Power Multiple Use FM Transmitters, KQMQ (FM), Honolulu, HI: Dawson & Hatfield determined the requirements for an antenna/transmitting system for Honolulu area broadcast stations. This determination included ensuring compliance with specific signal level requirements at the FCC Monitoring Station near Pearl Harbor. This project also included determination of requirements for coverage of the Honolulu area, while simultaneously

meeting the FCC requirements for two FM stations, KQMQ and KAIM, from a site at Palehua Ridge. Negotiations were conducted with antenna vendors to determine if their specific offerings met the requirements. A complete FCC application for facility licensing and a procedure for evaluation of the signal levels at the FCC monitoring station were developed, as well.

Land Mobile, Public Safety, Microwave and Policy Analysis Experience:

Project Manager and technical supervisor for Washington State Patrol: Conceptual design and facility specifications for microwave system route revisions for the Washington State Patrol. H&D has provided WSP with microwave network redesign options, cost analysis of alternatives, facility specifications, and support with land use and FAA negotiations. Because some portions of the microwave network were constructed before modern high reliability design standards were in use, the redesign options we have provided have resulted in upgraded operational reliability wherever possible. Our work has included recommendations for new repeater and passive repeater locations at intermediate sites, and VHF propagation analysis for these new site locations.

Technical consultant for the City of Seattle to develop conceptual design and specifications for replacement of the High Point repeater and microwave tower facility.

Technical consultant for microwave frequency planning for a 13-path microwave system, including route addition and overbuild, for the State of Wyoming ETV/FM project. Also served as Project Manager for the TV and FM selection and system-planning portion of the work.

Project Manager for the engineering portion of a Comprehensive Radio Plan: H&D performed a complete analysis of King County's wireless communications needs, present wireless systems and technologies, future systems and technologies available to meet the County's needs, the potential for re-allocation of the County's existing spectrum, and the potential impact of FCC regulations and international agreements on the County's wireless systems.

Project Manager for Curry County, Oregon Radio Communications Consulting Services: This project included evaluation and review of systems and needs, recommendations, and cost analysis. The following items examined system reliability, system transmission capacity, system coverage, FCC license inventory, routine operation requirements, emergency incident requirements, and barriers to communications efficiency and interoperability.

System Study, Pacific Gas & Electric, San Francisco, CA: Hatfield & Dawson conducted an emergency communications system study at the Diablo Canyon Nuclear Power Plant near San Luis Obispo.

Microwave System Design, City News Service, Los Angeles, CA: City News Service of Los Angeles is the largest regional news wire press service in the United States. It provides news service to subscribers in the Los Angeles basin, including newspapers, broadcasting stations, public agencies, and industrial customers. City News distributed this data by a complex network of telephone circuits leased in part from the Associated Press and in part directly from Pacific Bell. In the late 1980s, system reliability was deteriorating nearly as fast as its cost was increasing. Hatfield & Dawson studied the data distribution system, recommended possible alternative methods of distribution, and performed cost analysis. We provided City News with a plan for a microwave distribution system using frequencies in the private radio point-to-multipoint service. We recommended the central distribution transmitter site and antenna configuration. We analyzed propagation to the most difficult City News customer locations, several of which are not line-of-sight, and performed diffraction calculations to determine if adequate signal would be present. We also designed a point-to-point microwave link to interconnect the City News offices on Sunset Boulevard with the distribution site. We reviewed alternative receiver and modem designs, and selected and tested receivers for suitability for the system. The system resulted in cost savings (including amortization of its construction and implementation costs) of more than 50 percent, compared to the previous distribution system. The system operates with high reliability due, in part, to a design that provides for hot standby primary site operation with backup battery and generator power, and alternative delivery systems from the primary City News computer (where the data are generated) to the distribution site on Mt. Wilson. The system has an unmeasurably low data error rate due to the highly robust design of the data protocol and modulation scheme. It has operated with no down time through several earthquakes.

Electromagnetic Shielding for Residential Construction, The Horn Company, Las Vegas, NV: The Horn Company proposed a residential development near the antenna towers and radial ground system of the antenna for medium wave (AM or standard broadcast) station KORK. The Horn Company engaged Hatfield & Dawson to produce a report and drawings detailing building shielding measures for residential construction. Residential and commercial developments are often immediately adjacent to antenna systems of medium wave broadcasting stations. The electromagnetic fields from these transmitting sites are not high compared to safety standards accepted by responsible organizations, such as the National Council on Radiation Protection and Measurement and the appropriate committees of the American National Standards Institute. Nonetheless, the electromagnetic field levels in some locations in the proposed development will be high enough to cause "nuisance" problems. The explosion in home entertainment and other

domestic electronic devices in recent years has caused most households to possess numerous items, the operation of which may be affected by nearby medium wave transmitting activities. These include telephones, radio controlled garage door openers, stereos, VCRs, radios, computers, and other electronic devices. The Horn Company supplied Hatfield & Dawson with a property plat plan showing the individual lot boundaries of the proposed development, along with building plan data and photographs of typical residential construction details. The report and drawings provided by Hatfield & Dawson included detailed descriptions of installation and construction practices appropriate for shielding in this type of frame construction, which utilized exterior stucco applied over wire mesh ("chicken wire") as an exterior finish. In addition, the report addressed specific concerns and requirements necessary for effective shielding.

Policy Analysis, Canadian Department of Communications, Ottawa, Canada: Hatfield & Dawson prepared a policy analysis for the Canadian Department of Communications regarding allocation standards for FM broadcasting stations. This project involved extensive liaison with DOC personnel during two weeks at DOC headquarters in Ottawa, as well as inspections of facilities and sites.

Technical Analysis for Land Use Ordinance Development, City of Seattle, Seattle, WA: As part of a comprehensive rewrite of land use ordinances and regulations for communications facilities, Hatfield & Dawson prepared background studies and analysis for the City of Seattle Office of Long Range Planning. We conducted extensive measurements of existing levels of non-ionizing radiation, made recommendations for local ordinance standards for radio-frequency energy density, and assisted in the preparation of the environmental impact statement for the resulting ordinance.

Professional Activities:

Member, Association of Federal Communications Consulting Engineers

Member, IEEE (BTS and VTS societies)

Member, Society of American Military Engineers

Member of U.S. Delegation (by State Department appointment) to technical conferences and study groups of the International Telecommunications Union (UN agency) Geneva, Switzerland

Instructor, annual workshop on Medium Wave Antennas, Annual Conference of the National Association of Broadcasters, Las Vegas, Nevada

Publications (partial list):

Sharing AM Transmitter Sites by Diplexing Antenna Systems, by Benjamin F. Dawson III, presented at the 1987 Engineering Conference of the National Association of Broadcasters, Dallas, TX.

Analysis of a Sectionalized Tower as an Element in a Medium Wave Phased Array Using the Method of Moments, by Benjamin F. Dawson III, IEEE Transactions on Broadcasting, Vol. 35, No. 2, June 1989.

Modern Analysis Methods for Medium Wave Antenna Design, by Benjamin F. Dawson III, presented at the International Broadcasting Convention - 1990, of the IEE(UK), Brighton, U.K., September 1990.

Effective Methods of Supplementing Coverage Deficiencies for VHF FM Broadcast Stations, by Thomas M. Eckels and Benjamin F. Dawson III, presented at the Engineering Conference of the National Association of Broadcasters, Las Vegas, NV, April 1991.