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NEWSLETTER

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From the Editor

Mike Grissom <mikeg@slac.stanford.edu>

In this issue of the MEDHPE newsletter, we are providing three Feature Articles on medical health physics (MHP) operational programs. One from John Jacobus, at the National Institutes of Health in Maryland (MD); another from John Holmes, the RSO at Stanford University, California (CA); and the other from myself, a historical view of a military MHP program at the Oakland Naval Hospital, also in CA.

At this time, we are also introducing Andy Karam as the new MEDHPE editor "designate." Andy is considering new approaches to providing information to the section members including adding a Web site for the MHPS. If you have topical ideas for newsletters or recommendations for an MHPS Web site, please send them to Andy. Andy will be the editor for future MEDHPE issues starting in the year 2000. Andy has been a frequent contributor to the radsafe list server and is well known (cyber-speaking) to many of the world's HPs.

Jean St. Germain notes in her item below that an MHPS election will be held before the end of this year. If you have questions regarding the election criteria and officer responsibilities established in the section's by-laws, please contact Jacquie Ghiron Lindseth, the MHPS Secretary, whose email address is shown above.

Mike Grissom
Assistant Director (ES&H)
Stanford Linear Accelerator Center

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From the President: Jean St. Germain <stgermaj@mskcc.org>

Yes–We are going to have an election! Several MHP's are complaining about our recruitment process, but we have found victims to run for office. A ballot will come out before the end of 1999. Anyone who feels overlooked should call Frank Masse asap.

We are interested in topics which may be of interest for next year's meeting. As you all know the meeting is in Denver. Hopefully, we will not have the last session on the last day of the meeting again. Needless to add, this did not help our attendance. I am considering inviting someone from the NRC to discuss intravascular brachytherapy. We could also ask someone with an ongoing program to describe their issues. I would appreciate some feedback on this topic. The section has funds, and we can invite a speaker. Anyone can send me a suggestion. We may not agree with everyone, but we will read them all.

Jean St. Germain
Department of Medical Physics
Memorial Sloan-Kettering Cancer Center

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From the Editor-designate: Andy Karam <Andrew_Karam@URMC.Rochester.edu>

Introducing MEDHPE's new editor, Andrew Karam

I was recently asked to serve as the new editor for this newsletter, taking the place of Mike Grissom, who has been "acting" editor for much longer than he had originally planned. In so doing, I hope that I can maintain the same high level of quality and persistence he has shown in the time I have been receiving the newsletter.

For starters, Mike suggested I write a brief piece to introduce myself to you, especially those of you who don't follow my occasional postings to Radsafe.

I got my start in the Naval Nuclear Power Program in 1981. In all, I spent eight years in the Navy; two in various schools, two more as a mechanical operator staff instructor (teaching students the hands-on aspects of operating a reactor plant's mechanical systems), a few months learning to be an engineering laboratory technician (ELT), and then nearly four years assigned to a nuclear fast-attack submarine based in San Diego. During the tour on my submarine, the USS Plunger (really, that was its name, but not named after the bathroom utensil), I served as Leading ELT, ship's periscope photographer, and qualified to stand supervisory watches in the nuclear and non-nuclear ends of the submarine.

Following my discharge I returned to Ohio State University (OSU) to complete my degree in Geology. I worked nights at the local Kinko's for a year, then decided even radiation safety had to be an improvement and worked at the OSU Radiation Safety Office. I was recruited from there to work at the Ohio Department of Health (ODH) where I specialized in contaminated sites and DOE facilities. During this time I completed my undergraduate degree, writing a senior thesis on the interactions of uranium oxides and clay minerals.

Leaving ODH, I worked for an environmental consulting company as Manager of Radiological Services, providing technical support to the DOE office at the Portsmouth Gaseous Diffusion Plant, participating in environmental site investigations at a number of governmental and private facilities. I left this firm to return to graduate school, again at Ohio State, studying geology. Here, I worked for a year helping to write information sheets about Ohio's low-level radioactive waste (LLRW) disposal facility, before the project was canceled by the Midwest Compact. During this year, too, I found that I had passed the CHP exam, taken just before I returned to graduate school.

Full-time graduate school lasted for only a year before I returned to gainful employment, again with the OSU Radiation Safety Office. Here, I worked with OSU's LLRW and sealed source programs as well as acting as the computer systems administrator for a year. I completed my master-of-science (MS) degree during this time, writing a thesis on changes in terrestrial background radiation levels over the history of life. For my MS thesis I concentrated on changes due to the evolution of the earth's crust and to internal radionuclides (chiefly K-40).

I left OSU in June, 1998 to become RSO at the University of Rochester, where I intend to stay for a long time. I am continuing work on my PhD in Environmental Sciences at OSU (looking at changes in background radiation levels from cosmic and cosmogenic sources) and I hope to finish in another 3-4 years. In addition to my work and research, I do some private practice consulting (primarily in environmental or NORM/TENORM cases), I am a member of the ABHP's Part II Panel of Examiners, was recently elected president of the Western NY Chapter of the HPS, and I operate a list server for RSOs at medical and academic institutions. I'm also married with two sons (Alexander is 7 and Benjamin is 2.5) and more cats than ought to be permitted. It's enough to keep me relatively busy.

As far as editing the MEDHPE newsletter goes, I am planning on following the lead established by Mike for at least the first few issues. A number of thoughts have occurred to me regarding possible changes, but I am also hesitant to mess with something that is working. I think the best way to proceed might be for me to describe some of the thoughts that have occurred to me and to ask for feedback from readers and contributors as to which of these you think would be good to try. And, if you have any suggestions in addition to my thoughts, please let me know.

My goals for this newsletter are to supply subscribers with timely, interesting, and useful information that can affect the way you operate, that can help you to operate your programs better, or that is of general interest. To this end, I will need a lot of assistance because I am a relative neophyte in the area of medical HP. Anyone with article suggestions is welcome to submit them, and anyone who wants to submit an entire article can send it to me in Word or WordPerfect format. And now, before I sign off, a listing of two of the ideas that have occurred to me:

- Post extended article abstracts for brevity with links to a MEDHPE WWW site containing full text, figures, etc. in PDF format.
- Maintain a WWW site with PDF formatted back issues of MEDHPE.

For those of you who have read this far, thanks for your patience. I will look forward to working with all of you in the future.

Andy

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FEATURE ARTICLE John Jacobus <JJacobus@exchange.nih.gov>

Radiation Safety Program At the National Institutes of Health, Part 1

By John Jacobus
Staff Health Physicist

The National Institutes of Health (NIH) in Maryland is the largest federal biomedical research organization in the United States. The 18 institutes conduct biomedical research within their own facilities at NIH, or sponsor the work of non-Federal scientists in universities, industry, schools, hospitals or other research facilities. Besides the main Bethesda campus, several off-site NIH facilities are located in Rockville, Poolesville and Baltimore, Maryland. There are approximately 3,000 laboratory modules where radionuclides are used.

Clinical research is centered in the Warren Grant Magnuson Clinical Center on the main campus. This is a 14-story, 250-bed facility with a mix of research laboratories, clinics, and nursing units that supports over 7,000 inpatients and over 68,000 outpatient visits each year. In addition to medical patients, about 3,400 normal or health volunteers also participate in inpatient or outpatient clinical trials, who may come from around the world.

Radiological activities associated with patient care are found in an active nuclear medicine department, diagnostic radiology department, and an oncology branch that performs teletherapy treatments. Diagnostic radiology has one fluoroscopy unit, two C-arm fluoroscopes, six general radiographic units, four computerized tomography (CT) units of which one is an electron beam unit, one portable CT, two mammography units, and three magnetic resonance imaging (MRI) units. Nuclear medicine has three two-headed, two three-headed and one cardiac gamma cameras of various configurations and two x-ray bone densitometry units.

Radiation oncology has three linear accelerators that provide the following energies:

Varian Clinac 6

6 MeV Photons
(Can perform stereotatic procedures)

Varian Clinac 2300

2 photon beams (6 MeV and 15 MeV)
6 electron beams (6, 9, 12, 15, 18, and 22 MeV)

Varian Clinac 20

2 photon beams (6 MeV and 15 MeV)
5 electron beams (6, 9, 12, 16, and 20 MeV)
(Can perform total body irradiation)

Radionuclide therapies are currently limited to ^{131}I ablation therapies and ^{89}Sr for bone therapy. Last year, 27 therapies for thyroid cancer and 35 hyperactive thyroid therapies were performed. Radionuclide labeled antibodies have involved the use of ^{90}Y, ^{177}Lu, and ^{111}In, and future antibody studies will involve the alpha emitting radionuclides ^{213}Bi and ^{211}At. Presently, the NIH is not performing brachytherapy procedures.

Cyclotron Operations

Two cyclotrons produce positron-emitting nuclides for three positron-emission tomographic (PET) scanners. The specifics associated with these cyclotrons are listed below.

1. The Cyclotron Corporation, Model CS-30, was installed in 1985, and no major modifications have been made to it.

Beams	**MeV**	**Int/Ext Currents (µAmp)**
Proton	26.5	200/60
Deuterium	14.8	300/100
Tritium	38.1	135/60
Alpha	29.6	90/40

2. Japan Steel Works, Ltd., cyclotron, Model JSW-1710, was installed in 1985, and no major modifications have been made to it.

Beams	**MeV**	**Int/Ext Currents (µAmp)**
Proton	17.5	150/50
Deuterium	9.8	150/50

The two cyclotrons are available 12 hours a day, 6 days per week, with a normal operating schedule of 35 hours per week for radionuclide production. Radionuclides routinely produced include the following:

Radionuclide	**Target**	**Activity (GBq)**	**Frequency**	**Comments**
^{15}O	N_2	~ 1/min	~4-6 hrs/dy	[^{15}O] water
^{13}N	H_2O	1 - 2	5-10/wk	[^{13}N] NH3
^{11}C	N_2	3 - 75	3-12/wk	[^{11}C]-Raclopride
				[^{11}C]-Palmitic Acid
				[^{11}C]-Arachidonic acid
^{18}F	Ne	1 – 15	3-10/wk (from Ne)	[^{18}F] FDG
				6-[^{18}F] Fdopa
				6-[^{18}F]-F-Dopamine
				6-[^{18}F]-Cyclofoxy
				[^{18}F]-FPrTZTP
^{18}F	^{18}O	15 – 30 (95%)	~5/wk (from ^{18}O)	
^{211}At	Bi	0.5 – 1.5	~3/wk	

References:

1. "Radiation Safety in a Large Biomedial Research Institution" by Robert A. Zoon, Roger W. Broseus, and William F. Holcomb, in Management and Administration of Radiation Safety Programs, ed. Charles E. Roessler, HPS Summer School, 1998.

2. Personal communications, NIH Cyclotron Facility, 1999.

3. Personal communications, NCI Radiation Oncology Branch, 1999.

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FEATURE ARTICLE John Holmes <jholmes@leland.Stanford.EDU>

Medical Health Physics at Stanford University
by John A. Holmes, RSO
September 16, 1999

The radiation safety program at Stanford University (SU) had its beginnings in the late 1940's. The first program was associated with the linear accelerator project at the Microwave laboratory. The Medical School, then located in San Francisco, had medical physics faculty who addressed safety problems associated with the radiology department, including nuclear medicine and radiation therapy. Efforts there included pioneering work on the first electron linear accelerator to be used in routine clinical procedures. Soon after the Stanford School of Medicine was relocated to the main campus in 1959, the development of a more comprehensive radiation protection program for the University began.

At the time that California became an agreement state in 1962, Stanford possessed more than 20 radioactive materials licenses. A staff of two professionals and a part-time student were devoted to radiation safety and industrial hygiene activities. In 1965 the licenses were consolidated under a single California broad scope radioactive materials license including both research and human uses. By that time the staff had grown to three professionals, two technicians, two clerks, and some student help. The scope of work included radiation safety and industrial hygiene. From the late 1960s to the early 1980s the California license also covered similar activities at the Veterans Administration (now Veterans Affairs, VA) Medical Center in Palo Alto. The VA facilities were placed under a US Nuclear Regulatory Commission (NRC) license in the 1980s to satisfy the NRC legal counsel's jurisdictional concerns; however, the two programs still share common radiation safety rules and committees and are still under the oversight of the SU Health Physics program.

In 1999, Stanford has approximately 900 laboratories where licensed levels of radioactive materials are used; about 10% of the labs, including two nuclear medicine services, are located at the Veterans Affairs Palo Alto Health Care System's facilities.

As a part of the University's Environmental Health and Safety Department (EH&S), the present health physics staff includes nine professionals, one and one-half technicians, one computer analyst, three clerical, and one and a half full-time-equivalents (FTE) of support from para-professional personnel. The last are members of the EH&S Compliance Assistance Team, who perform monitoring activities in labs and who also address other safety program concerns. Additionally, one and one-half FTE of staff work in the related radioactive waste operation. Four and one-half FTEs of health physics professional staff and about 25 percent of the support staff perform a significant fraction of their work in support of clinical and clinical research activities at the hospitals. The remainder of the effort is allocated to other research, including medical sciences, biology, physics, chemistry, and engineering.

The clinical facilities are located in the former SU Hospital and Clinics, and Lucile Salter Packard Children's Hospital (LSPCH); both are now a part of UCSF-Stanford Healthcare. The hospital facilities include a 600-bed hospital at Stanford, 200 beds at LSPCH, and 900 beds in the VA Palo Alto Healthcare System. The campus hospital facilities share a common site with the School of Medicine and the principal VA site is located about three and one-half miles from the main campus. Both institutions have x-ray facilities located in more distant clinics.

The main radiation related clinical activities are associated with the Nuclear Medicine Section of the Department of Radiology, the Department of Radiology, and the Radiation Oncology Department. The Nuclear Medicine Section includes five faculty members, two of whom are assigned to the VA. Nuclear Medicine has three operational sites, the Campus, the VA Palo Alto, and the VA Livermore Medical Center. In addition to the array of cameras, the campus division also operates a dual energy x-ray analysis (DEXA) system for bone studies. The VA also operates a PET center which is accessible to the University as well as VA patients.

The Department of Radiology also includes mammography, interventional, CT, GI, Chest, and MRI sections. The Cardiology, the Cardiothoracic Surgery and Surgery, and Emergency Medicine Departments also use x-rays extensively. The eighty-nine diagnostic machines presently in use include four mammographic, four CTs, sixteen C-arms, a lithotripter, plus standard fluoroscopic and radiographic units. There are also a small number of cabinet x-ray units and electron microscopes in the Pathology Department labs. The VA sites use fifty diagnostic machines including one CT, ten C-arm, and twelve dental units. The VA Pathology Service uses two electron microscopes and a cabinet x-ray. The VA also houses two DEXA units in its Department of Medicine. Also, an independent commercially operated cyclotron (11 MV proton) is located on the VA site adjacent to the PET Center. The cyclotron produces pharmaceuticals labeled with ^{18}F, ^{15}O, and ^{13}N.

The Radiation Oncology Department operates five medical linacs, plus one in a shared facility, an intraoperative orthovoltage unit, treatment planning devices, a high-dose rate brachytherapy unit and a low-dose rate brachytherapy program. The department also shares a major research effort with the Cardiology Department to evaluate the use of radiation in prevention of restenosis following angioplasty procedures. There is no Radiation Oncology Service at the VA Palo Alto Health Care, though on occasion patients are treated with low-dose rate brachytherapy procedures at the VA by accredited radiation oncologists from Stanford. Health Physics routinely checks personnel protection systems for the therapy systems and reviews required physics reports for timeliness and completeness. Health Physics also makes radiation surveys in patient rooms.

Health Physics provides the following services: Evaluating uses and maintaining the approval process, periodically auditing radiation safety in projects, conducting radiation surveillance in storage and work areas, testing and distributing dosimeters, investigating unusual exposures, performing bioassays, calibrating survey instruments, receiving and shipping radioactive materials, maintaining a central inventory of materials and devices, teaching radiation safety to users and ancillary personnel, conducting seminars for residents and graduate students, testing radiation producing machines, preparing radiation safety procedure manuals and guides, responding to incidents, performing license related activities for the State and NRC, registering radiation producing machines, responding to proposed changes in regulations, overseeing safety in radioactive waste operations, maintaining records of compliance, overseeing laser safety, and so on.

Health Physics interacts with the Physics Sections in Radiology and Radiation Oncology training new residents and assessing compliance of diagnostic machines with regulations and the NCRP standards. Health Physics does not perform the patient related physics measurements or any treatment planning for Radiation Oncology. New facilities and shielding needs are reviewed by Health Physics. Shielding design and acceptance testing for therapy machines is a joint project between the Radiation Oncology physicists and Health Physics. The Diagnostic Physics Section is principally involved in research and teaching activities and does not make the compliance measurements, environmental surveys, or perform shielding evaluations. Health Physics evaluates shielding requirements and performs shielding testing for the diagnostic units. Health Physics lectures in the residents physics curriculum in Radiation Oncology, Radiology, Nuclear Medicine, and Cardiology.

Health Physics is active in the review of medical research projects that involve patients receiving radiation doses. Entrance skin, organ, and effective doses (or dose equivalents) are assessed using databases taken from machine compliance measurements and Monte Carlo programs. For radioisotope protocols MIRD methodology is used to calculate doses to patients. When appropriate, Health Physics provides risk information using BEIR or ICRP models. Research investigators are referred to our Web pages for pre-approved consent verbiage related to various dose levels. These documents are supplied to the Institutional Review Board and to the Clinical Radiation Safety Committee who conduct parallel simultaneous independent reviews of the proposed research. The RSO serves as an ex officio member of the Institutional Review Boards and the Clinical Radiation Safety Committee (and other radiation safety committees) and supplies staff support to the latter.

Another current major interest of Health Physics is to seek to improve the dose data available for interventional procedures and to seek methods of reducing the doses to the patients and to the staff consistent with ALARA goals and FDA guidance. Members of the Health Physics staff work closely with clinicians to address these issues.

A few selected publications reflecting the contributions of members of the professional staff to the science and practice of Medical Health Physics over the years are listed below:

1. R.C. Barrall, S.I. Smith, "Personnel Radiation Exposure and Protection from Tc-99m Radiation" in AAPM Monograph No. 1, 1976.

2. Holmes, J.A., "Laser Safety", in Evaluation and Installation of Current Laser Systems (related to laser use in medical and surgical practice) edited by David Apfelberg, M.D., Springer-Verlag (1986).

3. Ana Mello, M.D. Ross Isaacs, M.D., Jeffrey Petersen, M.D., Sheila Kronenberger, B.A., and I. Ross McDougall, M.D., "Management of Thyroid Papillary Carcinoma with Radioiodine in a Patient with End Stage Renal Disease on Hemodialysis" Clinical Nuclear Medicine, Volume 19, No. 9, 1994.

4. Norbash, Alexander M., Busick, Don, Marks, Michael P., "Techniques for Reducing Interventional Skin Dose: Tube Position, Rotation, and Supplemental Beam Filtration," American Journal of Neuroradiology, Volume 17, 1996.

5. Norman McElroy, "Worker Dose Analysis Based on Real Time Dosimetry", Health Physics, Volume 74, No. 5, 1998.

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FEATURE ARTICLE Mike Grissom <mikeg@slac.stanford.edu>

A Historical View of a Navy Medical Program
by Mike Grissom
CDR (MSC) USN, Ret.

Military medical health physics programs are structured somewhat differently from those seen in non-military institutions. In particular, the scope of the mission "owned" by the military RSO operating out of a large medical treatment facility (MTF) can extend far beyond the boundaries of the hospital complex itself. In this article, I will briefly summarize the scope of activities that were conducted from Naval Hospital, Oakland (NHO), California (CA) during the 1985-1991 period when I was the NHO RSO.

These activities are fairly typical of those seen for naval medical RSOs assigned to shore facilities providing support to the operating forces (such as ships afloat, Marine Corps units, support bases, naval air). The nature of the radiation protection services, and examples of facilities and units supported, are shown below. I (and/or members of my staff which varied from one-half to five FTEs) provided primary support to those activities/units as indicated, with secondary activities--including RSO exchange audits/program reviews and higher-level command support functions--also shown:

- Medical Byproduct Material License (MBML) Program Activities associated with a medical radiation safety program, largely nuclear medicine (diagnostic and therapeutic), clinical investigations, and therapeutic radiology (brachytherapy). Laser Safety Officer (medical) activities tracked with the organizations needing MBML support.

- Laboratory Byproduct Material License (LBML) Program Activities associated with iodine-125 used in radioimmunoassay (RIA) tests, at facilities performing many thousands of tests per annum.

- Radiation Health Program (RHP) support activities including medical records maintenance and audits, dosimetry issue and records, afloat and ashore naval nuclear propulsion radiological controls programs, and naval nuclear weapons radiological control program.

- Medical and Dental Radiography (MDR) support activities including x-ray performance inspections, new equipment installations and MHP support to the Varian Clinac 6/100 linac (usually in conjunction with the therapeutic medical physicist) and x-ray radiation protection surveys.

- Non-medical Radiation Generating (NRG) support activities including industrial radiography (x-ray and radionuclide), radiological accident response and accelerators (research).

While the above categories do not account for all of a naval RSO's activities (for example, performing general military duties including presiding over an administrative non-judicial punishment board), they do account for much of the MHP work-load.

Using the information from above, activities supported from Naval Hospital, Oakland (NHO), included (not all inclusive):

- Naval Hospital Oakland, CA

    - Primary, a 500-bed hospital (only 200 in use)
    - MBML, RHP, MDR, NRG (sub-contractors)

- Naval Hospital, San Diego, CA

- Secondary (local RSO support)
- MBML, LBML (NDSL, San Diego), RHP

• Naval Hospital, Bremerton, WA

  - Secondary (local RSO support)
  - MBML, RHP

• Naval Hospital, Adak, Alaska

  - Secondary
  - RHP, MDR (Medical and Dental)

• Naval Drug Screening Laboratory (NDSL), Oakland, CA

  - Primary (local ARSO support)
  - LBML, RHP

• Naval Hospital, Naval Air Station (NAS), Lemore, CA

  - Primary
  - RHP, MDR, NRG (NAS, Lemore)

• Branch Dental Clinic, NAS, Lemore, CA

  - Primary
  - RHP, MDR

• Branch Medical/Dental Clinics, NAS, Alameda, CA

  - Primary
  - RHP, MDR

• Branch Medical/Dental Clinics, NAS, Fallon, NV

  - Primary
  - RHP, MDR, NRG (NAS, Fallon)

• Branch Medical/Dental Clinics, NAS, Moffett Field, CA

  - Primary
  - RHP, MDR, NRG (NAS, Moffett)

• Branch Medical/Dental Clinics, Naval Communications Station, Stockton, CA

- Primary
- RHP, MDR, NRG (Non-ionizing)

- Branch Dental Clinic, Naval Facilty, Centerville Beach, Ferndale, CA

    - Primary
    - RHP, MDR

- Branch Medical/Dental Clinics, Mare Island Naval Shipyard, Vallejo, CA

    - Primary (local RSO/RHO support)
    - RHP, MDR, NRG (Radiac Calibration, full scale contaminated casualty exercise annually at NHO)

- Branch Medical/Dental Clinics, Naval Station (NS), Treasure Island, CA

    - Primary (local RSO/RHO support)
    - RHP, MDR, NRG (Naval Radiac School)

- Branch Medical/Dental Clinics, Naval Supply Center (NSC), Oakland, CA

    - Primary
    - RHP, MDR, NRG (Radioactive commodities, West Coast radwaste contract, NSF antarctica radwaste, D&D surveys)

- Branch Medical/Dental Clinics, Naval Weapons Station (NWS), Concord, CA

    - Primary
    - RHP, MDR, NRG (Intermediate Response Force)

- Naval Aviation Depot, Alameda, CA

    - Primary
    - RHP (dosimetry), NRG (DU, x-ray)

- Naval Post-graduate School (NPGS), Monterey, CA

    - Primary
    - RHP (Ft. Ord records), NRG (100 MeV linac)
    - MDR (Dental Clinic, NPGS)

- Nuclear Powered Aircraft Carriers

    USS Enterprise

USS Carl Vinson
USS Theodore Roosevelt

- Primary
- RHP, MDR, NRG

- Nuclear Powered Frigates

  USS Arkansas
  USS California
  USS Texas

  - Primary
  - RHP, MDR, NRG

- Other Carriers

  USS Nimitz
  USS Kitty Hawk

  - Secondary
  - RHP, NRG

- USS Samuel Gompers

  - Primary (local RHO support)
  - RHP, MDR, NRG

- USS Kansas City, and other auxiliary ships

  - Primary
  - RHP, MDR, NRG

- USS Gallant, and other small support ships

  - Primary
  - RHP, NRG

- And a number of other activities/units

Note: RSO = Radiation Safety Officer
ARSO = Assistant Radiation Safety Officer
RHO = Radiation Health Officer

During my first years at NHO, I attempted to always be at the hospital for ^{131}I ablation patients (about 1 every 6-8 weeks). After that, I had built a more stable staff that was sufficiently trained (with the assistance of the therapeutic medical physicist and radiopharmacist) to provide coverage while I was on off-site missions.

I also had the normal medical licensee RSO duties of supporting the Radiation Safety Committee (and a number of other institutional committees at NHO and the regional medical command also on the grounds of NHO), consultations with patients and staff, performing pregnant patient and staff follow-up studies, running MIRDOSE for release and dose estimation purposes, assist the provision of physics instruction to radiology and nuclear medicine residents, radiography and nuclear medicine technician training and inservice instruction, management of radioactive waste, and so on. The license program's focus was on nuclear medicine uses, diagnostic and therapeutic, and therapeutic radiology, primarily brachytherapy using ^{137}Cs sealed sources and a ^{90}Sr eye applicator. There was also a small clinical investigations program that used ^{14}C, ^{3}H, and ^{125}I in laboratory and small animal facility studies.

In the area of primary responsibility, I had about 200 x-ray tubes of many types to survey on a periodic basis: c-arm fluoroscopes, Radiographic/Fluoroscopic units, plain film radiography, chest radiography, digital subtraction angiography, biplanar angiography, two CT scanners, three mammographic units, panographic and plain film dental radiography. There were additional specialty radiographic units in the Urology and Orthopedics clinics. Medical radiographic equipment was surveyed at least once every two years for performance and at least once during my tour for radiation protection (such as shielding/barrier evaluations). More frequent visits were needed for surveying new installations and recently repaired machines, often on short notice and in conjunction with the biomedical repair staff and/or manufacturer representatives/installers. Planning for new facility installations was generally done by the therapeutic medical physicist, who did not routinely do off-site missions during this period.

The therapeutic medical physicists who served at NHO during this period included (all of whom from time-to-time assisted in the MHP aspects of the program):

- Mike Taylor (ARSO who supported many of the off-site customers above before my arrival at NHO), recently retired from the Navy and last at the National Naval Medical Center in Bethesda, MD.
- Kim Working (ARSO), now at St. Thomas Hospital, Radiation Oncology Department in Nashville TN.
- Julian Manders (ARSO), now at the Nucletron Corporation, Columbia, MD.
- Mary Jo Ramsey (ARSO and RSO NDSL Oakland prior to my departure from NHO), now at the ROC in Sacramento, CA.

In addition, Dennis Honeychurch, for about 20 years the NHO radiopharmacist, assisted in ensuring nuclear medicine quality control, radiopharmaceutical accountability and radiation safety were managed on an every-day basis. Dennis is now a pharmacist in Oakland working with a commercial drug store chain.

Even though I rarely got to wear my research hat in diagnostic medical physics, primarily nuclear medicine instrumentation and computerized image analysis, I still served as the President of the San Francisco Bay Area Chapter of the American Association of Physicists in Medicine (SFBAC AAPM) and regularly attended the meetings of the Northern California Chapter of the HPS (NCC HPS), whose annual Western Regional Landauer joint meeting with the SFBAC AAPM was held at the NHO Officer's Club, which was entirely dedicated to that event, with my sponsorship (still required in those old days).

In conclusion, I managed a high-intensity medical HP program (with side-bars in non-medical radiation protection programs) during this period. It is interesting to note that many of the shore facilities and ships shown above have since been closed or decommissioned, only NAS Moffett Field, NWS Concord and NSC Oakland are still functional in the immediate San Francisco Bay area. The US Navy is a good deal smaller now than it was in 1991.

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medhp-sec/e/off List Owner Mike Grissom <mikeg@slac.stanford.edu>

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End MEDHPE Vol. 2 No. 3 September 1999

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Erratum: medhp-e, 08:49 AM 9/28/99 –0700, Erratum for MEDHPE Vol. 2 No. 3 (September 1999)

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