Major career contributions of Collé to radionuclidic metrology at NBS / NIST (1975-2015)

- instituted forerunner of NRMAP program -- first work on any radiopharmaceutical standards by lab; first complete MQA program with proficiency testing, used as model for many others & still running after 40 years

- developed all of the lab procedures (still in use by the lab today) to do high level preparations & calibrations (source handling, shielded weighing, ampoule sealer, etc)

- established environmental radiation data reporting guidelines that were adopted by industry, states, and federal regulators (EPA, DOE, NRC) and have been in use since late 1970s (Bronze Medal, 1981)

- NBS Delegate to the historic BIPM meeting on measurement uncertainties, which resulted in the adopted 1980 CIPM Recommendations (originator of “type A and B” designators)

- served on & chaired first ISO international working group on uncertainties that led to GUM

- revitalized radium / radon program at NBS / NIST – designed, constructed, built replacement PIC system with gas purification & transport manifold -- established lab as the premier radium and radon metrology laboratory in the world; became informal international standard in initial years -- served on over 18 national & international committees involved with radon health issue

- principally responsible for developing three unique standards based on diffusion of radon in polyethylene; viz., radon in water generator, large -area flux density standard, emanation capsule.

- Precise measurement (1993-95) of the ^{222}Rn half-life, and data evaluation

- performed definitive primary activity standardizations of ^{63}Ni (pure beta emitter) and ^{55}Fe (pure electron capture decay); both are amongst the most difficult decay modes to do primary standardizations on

- LS work contributed to NIST becoming one of the premier LS labs in world (^{209}Po, ^{36}Cl, ^{222}Rn, ^{226}Ra, ^{210}Pb, ^{63}Ni, ^{55}Fe, ^{32}P/^{33}P, ^{90}Sr/^{90}Y, ^{95}Zr/^{95}Nb), including work on cocktail composition effects and uncertainty assessments

- resolved long-standing need to verify ^{36}Cl/Cl AMS standards; requiring LS measurements (said to be “impossible to do” at very low activity concentrations (<0.04 Bq/g) and very high salt content (> 150mg NaCl per g of solution)

- designed & performed first (& ever) remote in-situ marine atmospheric measurement comparison for radon in Bermuda -- standard additions at ambient levels -- tested efficacy of global transport models

- developed a very quantitative and efficacious spiking protocol for solid granular matrices that had a verifiable matrix recovery “yield”, corresponding to an unaccounted-for loss of 34 grains of sand out of 2.7 million.

- Seminal work (first in the world) on digestive assays of brachytherapy sources (includes world's first standardization of ^{103}Pd); applied to four different types of sources, which led to model verification of dosimetric calculations because of the direct linkage between activity and dose measurements

- Maintained and demonstrated historical linkages of all standards of ^{226}Ra, ^{63}Ni, ^{90}Sr, ^{241}Am issued from 1950s to current time; verification of ^{63}Ni half-life by decay over 40 years

- Developed lab’s capability for absolute measurements of activity by calorimetry using a dual-compensated (He-refrigerator) cryogenic microcalorimeter and a dual-cell, isothermal (heat flow) microcalorimeter; used to provide first primary calibration for ^{103}Pd seeds (to treat prostate cancer, for ^{90}Sr seeds (to restenosis prevention following angioplasty) and a primary standardization of ^{55}Fe; wrote (2007) definitive modern review of classical radionuclidic calorimetry

- revitalized moribund SRM program; eliminated a multi-year backlog of certification paperwork and in first three years increased productivity by factor of 7. Bronze Medal (2008) in recognition.

- HIGH VISIBILITY: collaborated (with U Penn) on the first molecular binding measurement of radon: determined association constant of Rn to a cyrtophane molecular host

- Continuity of 25 years of work on ^{209}Po / ^{210}Pb: Po solution stability (1990); ^{209}Po SRM 4326 (1993); ^{209}Po decay scheme (1994); ^{205}Pb isomeric state with LS implications (1995); ^{209}Po SRM recertification (2005); revealed ^{209}Po half-life discrepancy(2005); ^{210}Pb SRM 4337 (2006); ^{209}Po & ^{210}Pb methodology & links (2007); ^{210}Pb comparison with NPL (2008); new ^{209}Po standardization methodology (2103); ^{209}Po SRM 4326a (2013); definitive 209Po half-life (2014)

- performed more informal measurement comparisons between sister labs and more formal international measurement comparisons than anyone in group in past 20 years.

- principally responsible for the initial lab training of most new RG members; trained more of the metrologists in group than any one else in past 25 years -- mentored best people -- more cooperative efforts in group than ever in fostering method comparisons