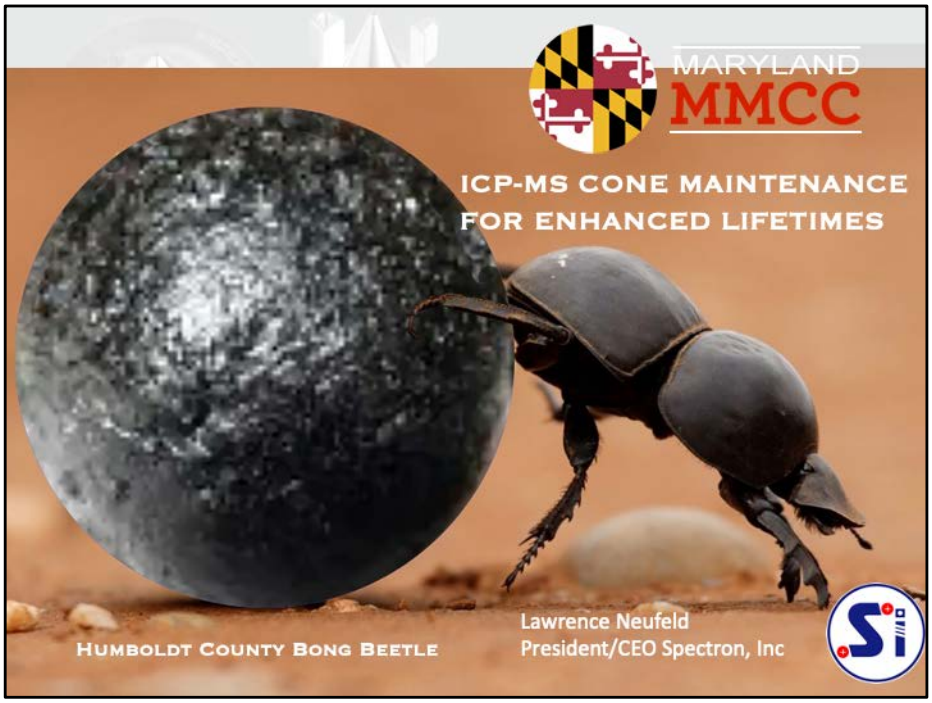
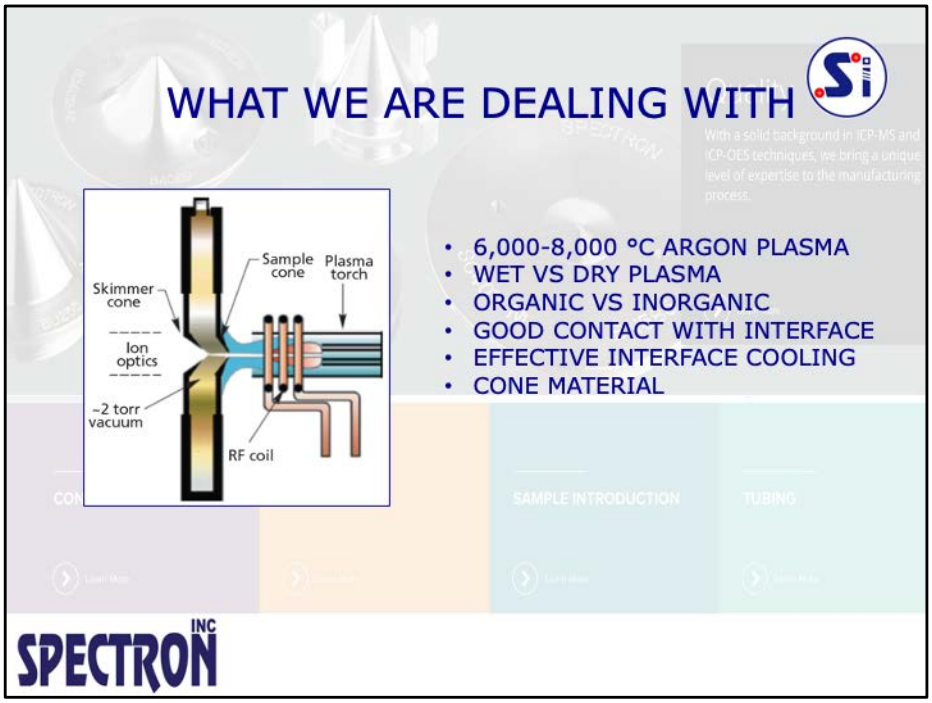

MARYLAND
MMCC
ICP-MS CONE MAINTENANCE
FOR ENHANCED LIFETIMES
Humboldt County Bong Beetle
Lawrence Neufeld
President/CEO Spectron, Inc


1980's
VG PQ1 ICP-MS '84
IBM PC '82
2000's
2010's
Google
GLASS
GOOGLE GLASS '12
BOSTON DYNAMICS '17
1990's
PLASMATRACE HR-ICP-MS '88
AGILENT 4500 BENCHTOP '94
PE ELAN 6100 DRC '99
SPECTRON INC


TOPICS FOR DISCUSSION
HISTORY MATTERS
TO CLEAN, OR NOT TO CLEAN
WHAT WE ARE DEALING WITH
FIRST DO NO HARM
THE TRULY STRONG ARE ALWAYS GENTLE
ELBOW GREASE
CALL A FRIEND
CONE GENEALOGY
IT'S EASY BEING GREEN
VALUE FOR MONEY
SPECTRON INC

DAILY PERFORMANCE LOGGING IS CRITICAL IN DETERMINING, AMONG OTHER THINGS, CONE PERFORMANCE. PARAMETERS SUCH AS VACUUM PRESURE, SIGNAL DEGRADATION, MASS REPSONSE AND STABILITY MAY ALL BE AFFECTED BY CONE DEGRADATION. ALTERNATIVELY, IF PERFORMANCE IS CONSISTENT WITH PREVIOUS GOOD RESULTS IT IS USUALLY BETTER TO LEAVE YOUR CONES ALONE.

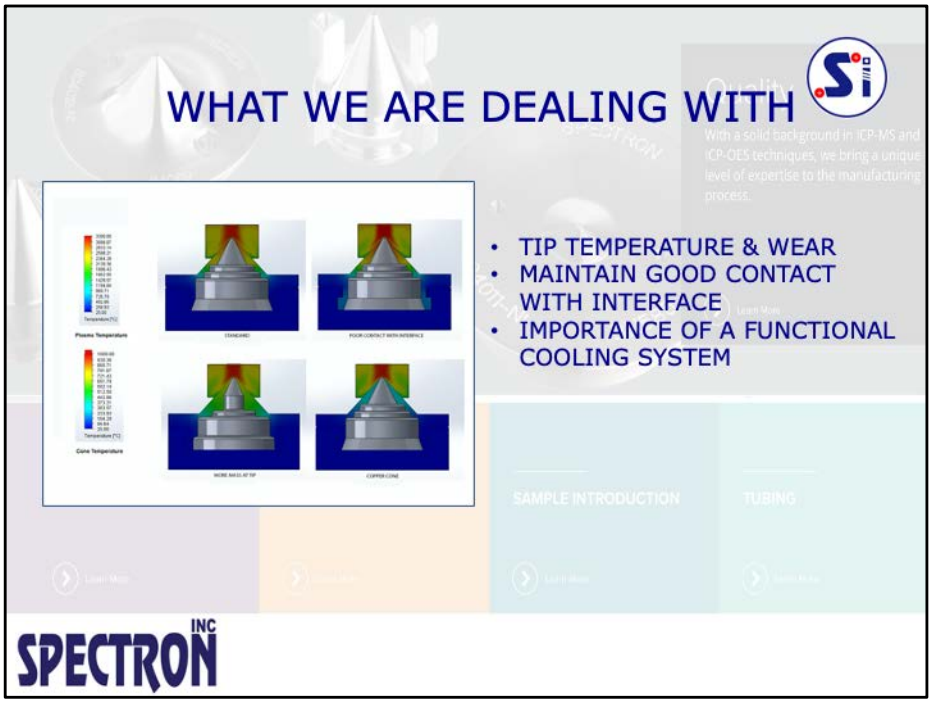
FREQUENT, UNNECESSARY REMOVAL, CLEANING AND REINSTALLATION OF SAMPLE AND SKIMMER CONES INCREASE THE LIKELYHOOD OF DAMAGE, OR PREMATURE WEAR. UNDERSTAND YOUR APPLICATION'S REQUIREMENTS AND ACT ACCORDINGLY. CONES DO NOT NEED TO LOOK PRETTY TO PERFORM OPTIMALLY. DO NOT OVERCLEAN.



AS WE KNOW THE ICP IS AN AGGRESSIVE ENVIRONMENT. CONE WEAR OCCURS THROUGH THERMAL AND CHEMICAL ABLATION AND THE RESULT OF VARIOUS CONE CLEANING TECHNIQUES. THIS CAN BE EXACERBATED BY SAMPLE MATRIX, OR POOR INSTALLATION AND CONTACT WITH THE WATER COOLED INTERFACE. ORGANIC MATRICES ARE PARTIUCULARLY HARD ON INTERFACE CONES

THE SKIMMER CONE IS BOTH MORE DELICATE AND MORE UNIQUE, BASED ON THE OVERALL DESIGN OF EACH ICP-MS THAN THE SAMPLE CONE. THEY ALSO PLAY A GREATER ROLE IN THE GENERAL PERFORMANCE AND QUALITY OF YOUR DATA. MAINTAINING THE ORIGINAL DIMENSIONS OF THESE CONES INSURES CONTINUED PERFORMANCE.

THOUGH ALSO IMPORTANCE TO PERFORMANCE, THE SAMPLE CONES ARE GENERALLY MORE SIMILAR IN DESIGN TO EACH OTHER. THEY ARE ALSO MORE ROBUST, HAVING MORE MATERIAL AT THE TIP. THIS ADDED MATERIAL ALSO MAKES THEM MORE SUITABLE TO REFURBISHING.



THE MODEL DISPLAYED REPRESENTS VARIOUS PARAMETERS THAT AFFECT TIP TEMPERATURE AND THEREFORE PERFORMANCE AND WEAR. GOOD OR POOR CONTACT WITH THE INTERFACE, POOR INTERFACE COOLING, ALTERNATE MATERIALS AND CONE MASS ALL PLA Y A ROLE IN CONE TIP TEMPERATURE.

AS WITH LIGHT SOCKETS, NEVER STICK FOREIGN OBJECTS, ESPECIALLY METALIC ONES INTO THE CONE ORIFICE. THE ORIGINAL DIMENSIONAL TOLERANCES CANNOT BE HELD BY MANUAL MANIPULATION.

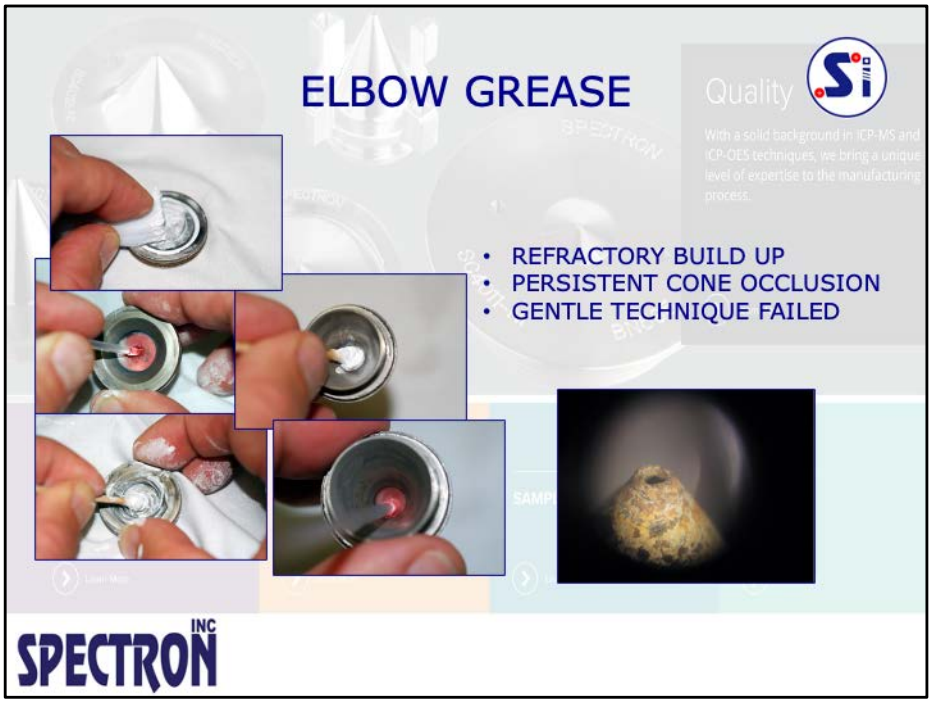
THOUGH SOME MAY SUGGEST CLEANING EXCLUSIVELY WITH DH2O, IT IS MY EXPERIENCE THAT THIS WILL ONLY WORK FOR MILD SALT BUILDUP. FOR SEVERE BUILD UP OF SALT DEPOSITS AND ESPECIALLY REFRACTORY OXIDES, OR OGANICS A SLIGHTLY MORE AGGRESSIVE APPROACH MAY BE NECESSARY.

FOR INORGANIC RESIDUE, START WITH A GENTLE APPLICATION OF 2% HNO3, WITH A COTTON SWAB, AT THE BACK AND FRONT OF THE CONE ORIFICE. LET SIT FOR 2-5', WIPE OFF RESIDUE WITH COTTON SWAB, THEN RINSE WITH DH2O. FOR ORGANIC OR MIXED RESIDUE START WITH 3% PEROXIDE SOAK FOR 15'-30'', THEN REMOVE RESIDUE WITH COTTON SWAB, OR CLOTH AND RINSE WITH DH2O. NEVER WIPE DIRECTLY ACROSS THE SKIMMER TIP. HOWEVER IF YOU CAN GET AWAY WITH A DH2O CLEANING PROCESS, DO IT.

GENTLY PLACE CONE(S) INDIVIDUALLY IN GLASS BEAKER CONTAINING 2% CITRANOX SOLUTION AND SONICATE FOR 10-15', FOLLOWED BY SONICATION IN DH20 AND A FRESH DH2O RINSE. IF CONES ARE STILL OCCLUDED YOU MAY WANT TO REPEAT HNO3 APPLICATION BEFORE ATTEMPTING A MORE AGGRESSIVE APPROACH.

THE ”ANALYTICAL ZONE” (1 CM AROUND ORFICE) IS THE IMPORTANT BIT, DON’T BE OVERLY CONCERNED WITH AESTHETICS.
NOTE: THIS CONE WAS PULLED FROM OUR RECYCLING BIN, THEREFORE SLIGHTLY DAMAGED.

IF CHEMICAL CLEANING IS UNSUCCESSFUL AT REMOVING MATERIAL OCCLUDING THE ORIFICE OF THE SAMPLE, OR SKIMMER CONE THERE ARE WAYS TO GENTLY CLEAN MECHANICALLY.



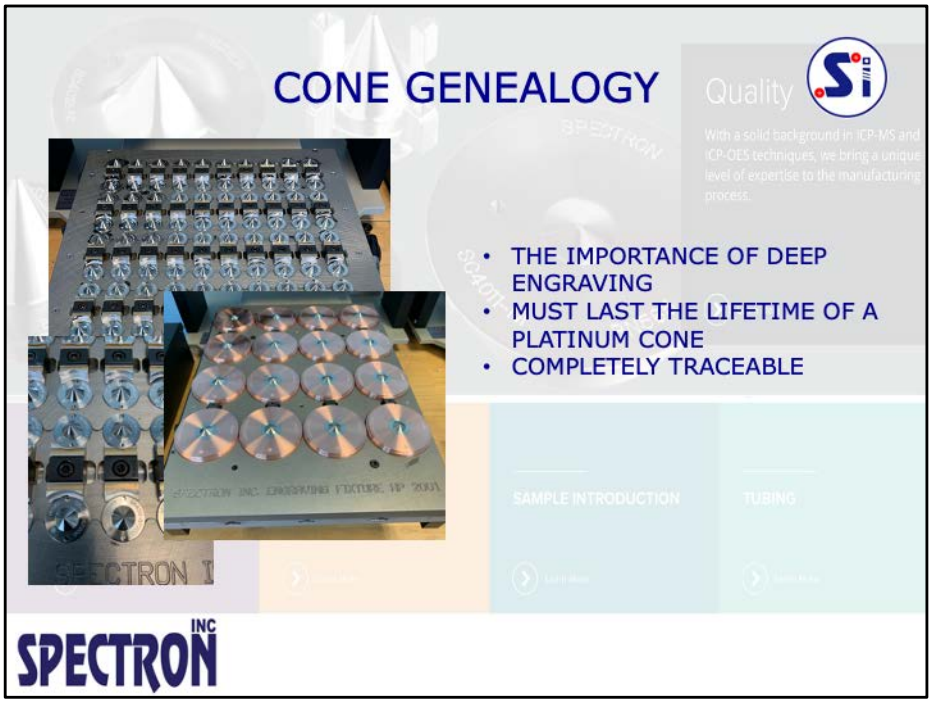
HIGH PURITY FINE ALUMINA POWDER, OR DIAMOND PASTE IS RECOMMENDED, BUT MANY HAVE USED BON-AMI™, OR SIMILAR CLEANING ABRASIVES. CREATE A PASTE ADDING DH2O TO ABRASIVE POWDER AND FIRST CLEAN THE INSIDE ANGLE OF THE CONE BY APPLYING PASTE WITH A COTTON SWAB. THE TOP ANGLE (TIP) OF THE CONE, ESPECIALLY THE SKIMMER CONE REQUIRES A MORE DELICATE APPROACH. WITH COTTON SWAB, OR GAUZE APPLY PASTE TO TOP ANGLE BUT NEVER APPLY PRESURE DIRECTLY ON TIP.

FOLLOWING A THOROUGH RINSING WITH SQUIRT BOTTLE, OR EQUIVALENT, PLACE CONES IN BEAKER OF DH20 AND SONICATE FOR 5-10', THEN REPEAT WITH FRESH DH2O. DRY WITH N2, OR AR

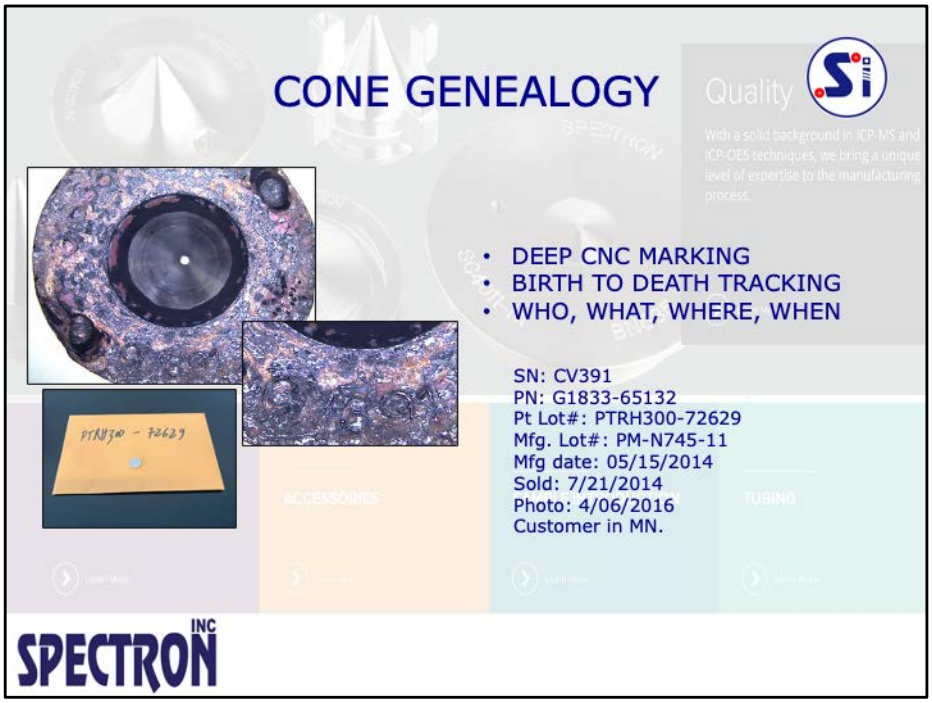
THERE MAY BE TIMES WHEN COMPLETE REMOVAL OF OCCLUSIONS ENDANGER THE INTEGRITY OF CONE GEOMETRIES. FOR PLATINUM CONES THERE IS AN ALTERNATIVE, CONE REFURBISHING. USING SIMILAR TECHNIQUES TO THE MANUFACTURING PROCESS IT IS POSSIBLE TO BRING CONES BACK TO ORIGINAL, OR NEAR ORIGINAL CONDITION. HOWEVER IT IS ONLY COST EFFECTIVE FOR PT CONES.

PLATINUM REFURBISHING CAN ALSO CORRECT DAMAGE CAUSE BY SLIPPERY FINGERS. IF THERE IS SUFFICIENT MATERIAL, CONES CAN OFTEN BE REFORMED AND RETURNED TO THE ORIGINAL GEOMETRIC TOLERANCES.

HOWEVER THIS MAY NOT BE POSSIBLE IF THERE IS NOT ENOUGH MATERIAL TO WORK WITH, OR IF THE PT IS SEVERELY ANNEALED



IN ORDER FOR OUR CONES TO BE COMPLETELY TRACEABLE IT BECAME NECESSARY TO ENGRAVE SERIAL NUMBERS DEEP ENOUGH TO WITHSTAND YEARS OF CHEMICAL AND THERMAL ATTACK.



COMBINED WITH OUR ARCHIVING OF ALL PT LOTS PURCHASED, WE CAN TRACE BACK ALL INFORMATON ON THE MANUFACTURE OF EACH CONE, REGARDLESS OF CONDITION.

MOST PT CONES CAN BE REFURBISHED MULTIPLE TIMES AND STILL BE TRACED BACK TO THEIR ORIGIN. FOR MANY USERS PT CONES MAY ACTUALLY BE MORE COST EFFECTIVE THAN NI CONES.

IT IS NOT UNCOMMON FOR OUR CUSTOMERS TO SEND BACK THEIR PT CONES FOR FREQUENT REFURBISHING, RATHER THAN RISK CLEANING THEM THEMSELVES, OR TO REPAIR FOR MINOR ISSUES. BOTH UPON RECEIPT AND FOLLOW REFURBISHING SPECTRON INSPECTS ALL CONES AND CHECKS THEIR DIMESIONAL TOLERANCES.

THOUGH WE CAN'T COST EFFECTIVELY REFURBISH YOUR NI CONES WE HAVE A RECYCLING PROGRAM. SEND US YOUR NI CONES AND WE WILL ADD THEM TO OUR NI RECYCLING STREAM, THEN GIVE YOU CREDIT BACK. FOR MORE INFORMATION GO THE LINK SHOWN ON THIS SLIDE.


THANK YOU!
SPECTRON INC