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The California Surveyor

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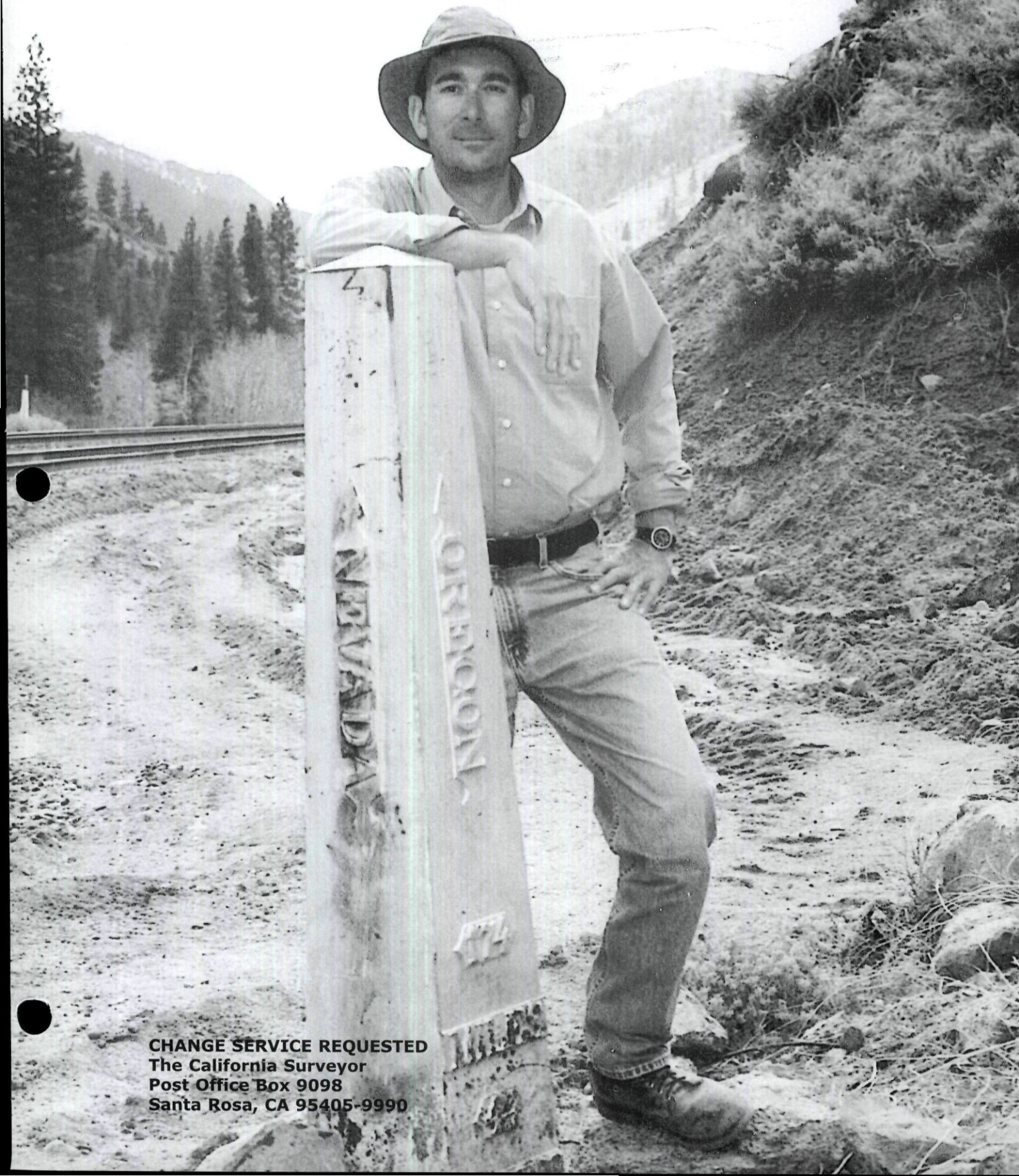

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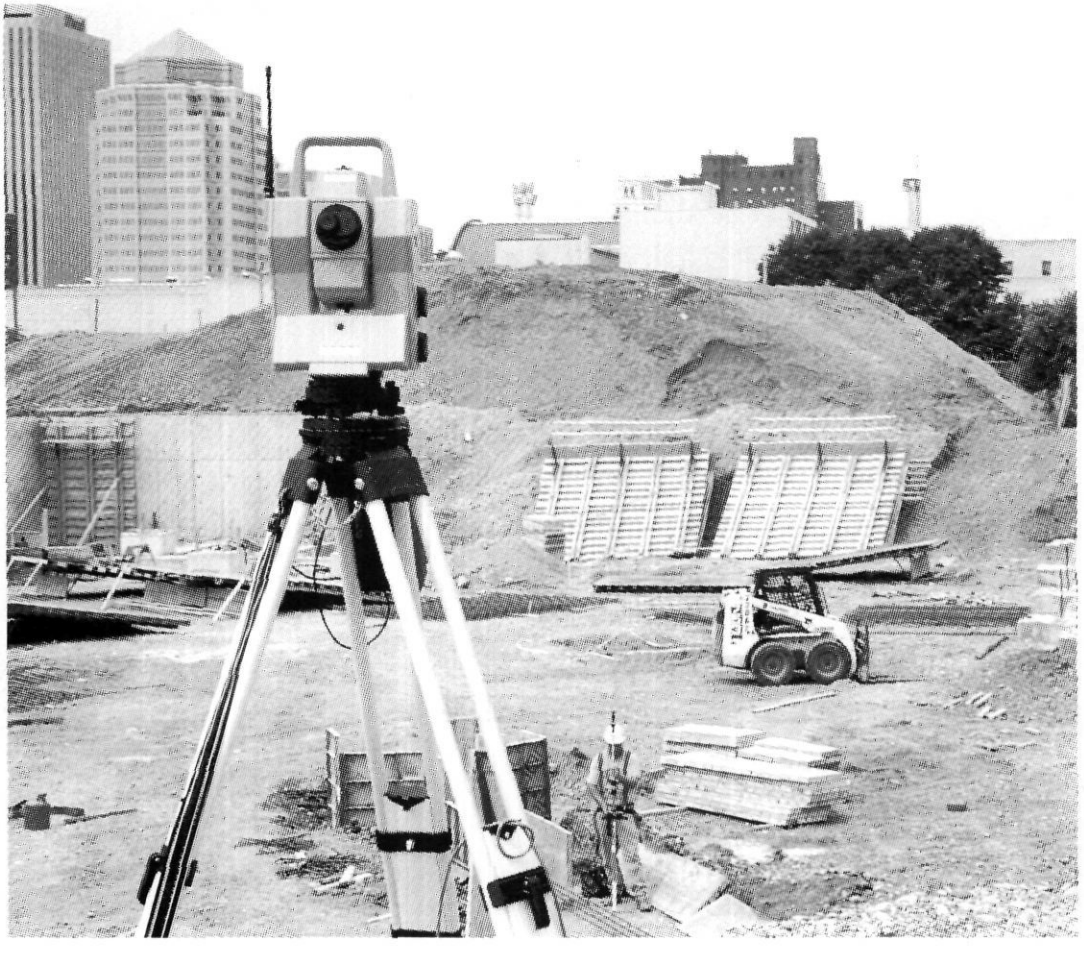

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The California Surveyor

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"Recognizing that the true merit of a profession is determined by the value of its services to society, the California Land Surveyors Association does hereby dedicate itself to the promotion and protection of the profession of land surveying as a social and economic influence vital to the welfare of society, community, and state."

"The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession of land surveying, to promote and maintain the highest possible standards of professional ethics and practices, to promote professional uniformity, to promote public faith and dependence in the Land Surveyors and their work."

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EDITORIAL MATERIAL

All articles reports, letters, and contributions are accepted and will be considered for publication regardless of the author's affiliation with the California Land Surveyors Association, Inc. Contributions submitted on floppy diskette medium and/or E-mail are encouraged. For compatibility, disks should be 3.5 inch, MSDOS (IBM compatible) format. We can accept ASCII text files or word processor files from the following programs: WordPerfect or Microsoft Word.

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DEADLINE DATES

Spring	January 10	Summer	April 10
Fall	July 10	Winter	October 10

Articles, reports, letters, etc., received after the above mentioned date will be considered for the next edition.

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On The Cover

This cast iron monument, set in 1873 by Allexey W. Von Schmidt, marks the California/Nevada state boundary in the vacinity of Verdi, Nevada. The intrepid surveyor posing next to it is John P. Wilusz, LS, PE. His friend Doug Kudlick snapped the photograph.

From the Editor

Tabula rasa . . . again!

By: Phil Danskin, PLS

This task reminds me of my illustrious high school daze: The "Moby Richard" book report is due tomorrow; I lost my catholic-educated cousin's book report-that-would-have-gotten-me-an-Ace (and she is three years my junior!) it's too late in the evening to call the "smart" girl, whose father, the sheriff, "popped" me for 80 in a 30 (I told him I was eager to get home to work on my book report) and video and Internet have not yet been invented. I was in a pickle.

Well here I am, thirty-plus years later and still haven't learned my lesson! Thanks to some very nice "cousins" and friends - we have something "professional" to read!

I was writing "25 July" in my field notes (I don't "*do*" electronic-only notes) on a beautiful mountaintop overlooking Jack London's Valley of the Moon, when I became anxious. That date? Anniversary? No, wife's mnemonic is "23rd Psalm" + "June" (my ex-mother-in-law's name). "*Honey, you forget that date and you will be walking in the Valley of Shadows with June*!" she'd remind me. Whew! Not our anniversary. *That* I forgot last month!

My mother's birthday. No. My late father had a mnemonic for that too. "*Son, your mother's birthday is the same as Hitler's - the radio-people will remind you.*" I forgot that one months ago - radio is busted.

All day, I couldn't seem to put my finger on the importance of this date. Oh well. Can't be that important.

Meanwhile, back at the ranch . . . I was checking my e-mail ('cause you never know when a friend is going to send you a good joke, or better, a picture) when I receive a message apologizing for not getting the article to me sooner! Epiphany! Today is the day all the material for this fine journal is forwarded to Central Office! Whew! Riddle solved. Besides Saturday's Board of Directors meeting - I know what I'll be doing over the weekend.

Your editor thought he was promoting something new - metrication, in the Spring issue. Not so! I received a call from my friend Sergio Saturnino Lobato De Faria, (Past President, Eugene Lockton's employee), that they recorded a "metric" survey in 1973. It might be the first metric map in Marin County (Book 8 of Parcel Maps, at Page 49). Another surveyor, Richard Coughlan, brought to my attention that he recorded the first metric map in Sonoma County in 1975 (Book 219 of Maps, at Page 29). And Professor Fareed Nader, reminded me of a metric article of his, published in a 1994 issue of the ACSM Bulletin (http://www.odyssey.maine.edu/gisweb/spatdb/acsm/ac94118.html). By the way, I would like to thank the three of you for reading our prodigious journal.

So, what "occurred" in the early seventies to have prompted some surveyors to ***go metric***?

Good news . . . but, could be better.

At July's CLSA Board of Director's meeting I learned that 22% passed the LS examination! Congratulation's new licensees! May I suggest that if you are not a member that you soon join and become active in our Association. Our Association could use some an infusion of exuberance. Besides, you'll obtain a continued education-just by attending chapter meetings! Call Central Office, (707) 578-6016, for a chapter near you.

Did you know . . . over seventy-plus percent of licensed professionals don't perform the simplest task: pay dues to *their* professional society? Yet, they reap the benefits of their organizations' efforts. It is not *just* our profession . . . Little League, engineering societies, etc., have the same problem. It is easier to "*watch*" than "*play*."

Pleasant musings: some chapters work as hard as they play. They perform deeds to benefit our profession as well as the public . . . from work-parties perpetuating monuments to the vigilant efforts of our the Legislative Committees. Hard work! Chapter secretaries struggle to write informative newsletters while balancing the demands of their business and/or employer.

Occasionally chapters let their hair down with such frolics as attending professional baseball games, picnics, blood drives (free cookie, juice and Heaven Points) golf tournaments, ski trips, etc.

Like King Kong, I'm gonna beat on my flabby chest once again and ask you to get excited with your profession. Consensus is difficult without the involvement of the majority of practitioners.

Join and be a part of **CLSA** *and* **NSPS** - professional societies that represent the interests of our profession!

❖

Workplace Ergonomics: The Key to Protecting Our Most Valuable Asset

By: Lou Antonelli, M.S. - Certified Rehabilitation Counselor/Disability Management Consultant

Injury Prevention In The New Millenium For The Professional Surveyor

Technology and the Workplace

It is no secret that the rapid advances of the technological revolution have changed virtually every workplace in a dramatic way. Microprocessors have found their way into just about every piece of machinery and equipment imaginable. Today the way in which work is performed bears little resemblance to the way it was done a relatively short time ago.

While there may be some naysayers who lament the overreliance on technology and the resulting snafus that can sometimes occur, there is little doubt that as a workforce we have passed the point of no return in the ever-evolving automation of the way in which work is performed.

From an injury prevention perspective, one would expect that this development would have a dramatically positive effect on lessening the occurrence of work injuries. Indeed, it is true that in California the trend is downward in terms of the total number of reported disabling work injuries. Since the early 1990's (when Workers' Compensation costs peaked) there has been a steady decline. State labor statistics show there were 9.9 workplace injuries for every 100 workers in 1990-91. By 1996-97, the rate had fallen to 7.1. Workers' Compensation benefit payments peaked at $7.9 billion in 1992 and since that time have been steadily declining. Among the factors contributing to this decline are safer workplaces due to technological advances.

But there is a downside to this trend. While the garden variety of sprain and strain injuries, which are the most prevalent work injuries, are down; a new work injury category has emerged and is on the rise: Repetitive Stress Injuries. These injuries are typically caused by repetitious use of the upper extremities, usually involving the use of a computer to key data into a terminal and/or using the mouse.

For the purposes of this discussion, we will focus on the Professional Land Surveyor to better understand the direct impact of the technological advances on the bodies performing the work. In the past, the major risk factors were sprains, strains and broken bones resulting from accidents in the field. Typically this would involve injuries caused by walking or climbing through uneven terrain, stepping into holes not visible or perhaps improperly lifting heavy equipment. Now, less time is spent

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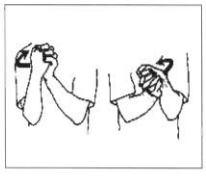
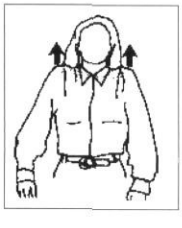
*1.**Hands & Wrists.*** Interlace your fingers in front of you. Rotate your hands and wrists clockwise 10 times. Repeat counter-clockwise 10 times. Stretch wrists.



*2. **Shoulders & Arms.*** This is a good stretch to use at the first signs of tightness or tension in the shoulder and neck area. Raise the top of your shoulders toward your ears until you feel a slight tension in your neck and shoulders. Hold this 3-5 seconds, then relax your shoulders downward into normal position. Think: "shoulders hang, shoulders down."



*3. **Shoulders & Arms.*** Hold your left elbow with your right hand. Gently pull your elbow behind your head until an easy tension-stretch is felt in shoulder or back ofyour upper arm (triceps). Hold easy stretch 10 seconds. Don't overstretch or hold breath. Do both sides. Stretches triceps, top of shoulders, and sides.

*4. **Shoulders & Arms.*** Interlace your fingers, then turn your palms upward above your head as you stratighten your arms. Think of elongating your arms as you feel a stretch through your arms and upper sides of your rip cage. Hold 10-15 seconds. Excellent for slumping shoulders. Breathe deeply. Stretches shoulders, back, arms, and hands seconds.

Excerpted from Stretching At Your Computer or Desk 1997 by Bob & Jean Anderson. Shelter Publications, Bolinas, CA. Distributed in bookstores by Publisher Group West. Reprinted by permission.

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Letters to the Editor

■ CALIFORNIA TRIG-STAR WINNER!

Sarah Kowallek is the National Society of Professional Surveyors California State Trig-Star winner for the year 2000.

Sarah, a junior at Rancho Buena Vista High School, recently participated in the local Trig-Star competition where she had the fastest time not only in her high school, but in the entire state. For her first place honors, she was awarded a plaque plus a check for $150 for being the school's "Trig-Star." She also received from the California Land Surveyors Association, a check for $750 and a plaque for being the sate winner. As state winner, Sarah qualifies to take the national test where she will be competing for a $1,000 scholarship. State coordinator and local professional land surveyor, Armand Marois on behalf of the San Diego Chapter of the California Land Surveyors Association, proctored the local test with the assistance of Lonnie Cyr and Dave Viera, both professional land surveyors.

Throughout her education, Sarah has been a stellar straight-A student with outstanding citizenship. Sarah is currently undertaking a full honors curriculum. At this time, Sarah has a 4.66 GPA and is ranked 12th out of 655 students in the junior class.

Sarah hasn't decided exactly what she wants to pursue as a future occupation, but it will probably deal with veterinary medicine.

For more information, please contact the National Society of Professional Surveyors nsps@mindspring.com or 301/493-0200.

Submitted by,

Armand A. Marios, PLS

■ PROPOSAL TO MAKE THE CALIFORNIA LS EXAM BECOME AN NCEES EXAM BY 2004

I am in full agreement that we turn over the bulk of the LS exam to NCEES. In my opinion the dismal pass rate of recent years is directly related to deficiencies in the exam itself.

To prepare a good exam of any type is not easy, but to prepare a good exam that becomes the primary hurdle for entry into a demanding profession is a daunting task to say the least.

Just think about what goes into the preparation of such an exam. It should be difficult, but not impossible or obscure. It should cause applicants to spend their time judiciously, but should not cause undue stress simply because too much is expected in the time allotted. It should cover all of the most important aspects of the profession and most of the moderately important aspects. It should contain questions that probe the knowledge necessary to decipher normal survey problems encountered in the real world; not the abnormally difficult situation that would only be approached by a seasoned expert.

The questions should be prepared by experienced professionals, then reviewed, tested, refined and reworked to insure appropriate levels of difficulty. Then, after all this, 12 months later you have to do it all again. All this care and attention and hard work that goes into the production of a good test has to be reinvented each and every year.

Personally, I think that this exceeds the abilities of any one state to carry out such an assignment. It is simply too demanding. There are bound to be many questions that will not measure up to the high standard expected. Remember, we owe a great responsibility, not just to the applicants who have expended great effort in the attempt to join our profession, and not just to the many private firms and public agencies that desperately need more qualified people to join their ranks, but to the public, who, at the very least, expect any particular profession to figure out how to go about bringing adequately competent practitioners into the field.

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Proposal ...LS Exam - Continued from page 8

We are not the AMA. We are not the Bar. We are a very, very small group in comparison to just about any other group governed by the Department of Consumer Affairs. We do not have the resources to prepare good, fair, comprehensive tests year after year after year.

This challenge should be turned over to NCEES as soon as possible. Then, we should channel our present resources into the production of a much smaller, state specific test to insure that local practices are not overlooked. This is something that we should be able to handle.

There have been some test questions that dealt with such complex, almost arcane situations that it's as if we were trying to admit only those applicants with abilities nearly equal to the most experienced among us. This is as wrongheaded as questions that are so simple as to admit the total novice.

Those newly licensed should be able to take on simple projects with no supervision, average projects with little supervision, and difficult projects only under the guidance of a seasoned mentor. It is simply wrong to create a test that attempts to admit only those that can immediately take on the entire breadth of the profession unaided.

One parting thought. What exactly is the goal, the Mission Statement, of the California LS Exam? Has anyone defined what the role of the test is in the licensing process? Does there exist a clear statement of what type of knowledge, what level of skill is being targeted by the test?

Not having seen one, may I propose a Mission Statement for the LS exam: It shall be the goal of the California LS exam process to determine if applicants have the requisite, minimal knowledge of the profession to correctly approach and handle, everyday survey problems of average difficulty.

Submitted by,

R. Lee Hixson, LS 4806

Workplace Ergonomics - Continued from page 7

in the field due to equipment that is safer and more efficient and less physically demanding, thus resulting in a reduction of these types of injuries.

But there is a price to pay for this reduction of time and physical activity in the field and increase of time in the office performing computer activities. That price is the cumulative effect on the hands, wrists, shoulders and cervical spine of long periods of time spent at the computer keyboarding and clicking the mouse to produce the finished work product. Essentially, a trade off has occurred as a result of the dramatic change in the nature of the physical activities required to produce the final work product: an alarming increase in the category of industrial injuries commonly known as Repetitive Strain Injuries.

Repetitive Strain Injury: An Epidemic

The changes in the way work is performed in the Digital Age and the incidence of RSI injuries reveal the emergence of an epidemic. In 1978 there were a total of 20,200 RSI industrial injuries reported, 14% of all injuries reported. By 1990, a total of 185,400 or 56% of all injuries reported were in the RSI category (U.S. Bureau of Labor Statistics).

Included in the general descriptive category of RSI are such specific diagnoses as carpal tunnel syndrome, ulnar nerve entrapment, deQuervain's syndrome, thoracic outlet syndrome and tendonitis. Other commonly used terms to describe this type of injury are Cumulative Trauma Disorder (CTD), Musculoskeletal Disorder (MSD), Repetitive Motion Disorders (RMI) and Overuse Syndrome (OS).

The causes for the onset of RSI are varied and controversial. Curiously, some workers violate every prudent ergonomic principle and do not experience any ill effects, fueling a prevalent undercurrent of cynicism that postulates all RSI as being " all in the mind". Anyone who has ever had first hand experience with this type of condition knows that these injuries are real. The fact of the matter is that there are indeed numerous risk factors which can affect individual workers in varying degrees and therefore simplistic statements of any kind are dangerous. These factors include the presence or absence of proper ergonomic postures and positions in performing repetitive work tasks, individual physical fitness, muscle tension, individual work habits, stress, long work hours without proper breaks and pre-existing related injuries.

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California/Nevada State Boundary

By: John P. Wilusz, LS, PE

Introduction

The California/Nevada State Boundary has a history as complex and colorful as the states it separates. The men who conceived it were short on experience but rich in dreams. It's a line that has been surveyed, resurveyed, and fought over on the battlefield and in the courts; and its location has been disputed right up to the present age. This article is an introduction to the story behind one of the most surveyed boundaries in the world.

The Treaty of Guadalupe Hidalgo

As a result of the Mexican-American War, the United States acquired a huge area known to Mexico as Upper California. It included land south of the Oregon Territory, west of the Rocky Mountains, and north of the newly established border between the United States and Mexico. The Treaty of Guadalupe Hidalgo, signed in 1848, was generous to the victors. Word was already spreading of the first gold strikes on the American River and by the spring of 1849 the entire world had heard of California. Dreams of instant wealth spread fast. The discovery of gold caused such phenomenal growth that in the fall of 1849 California was already preparing to enter the Union as a state.

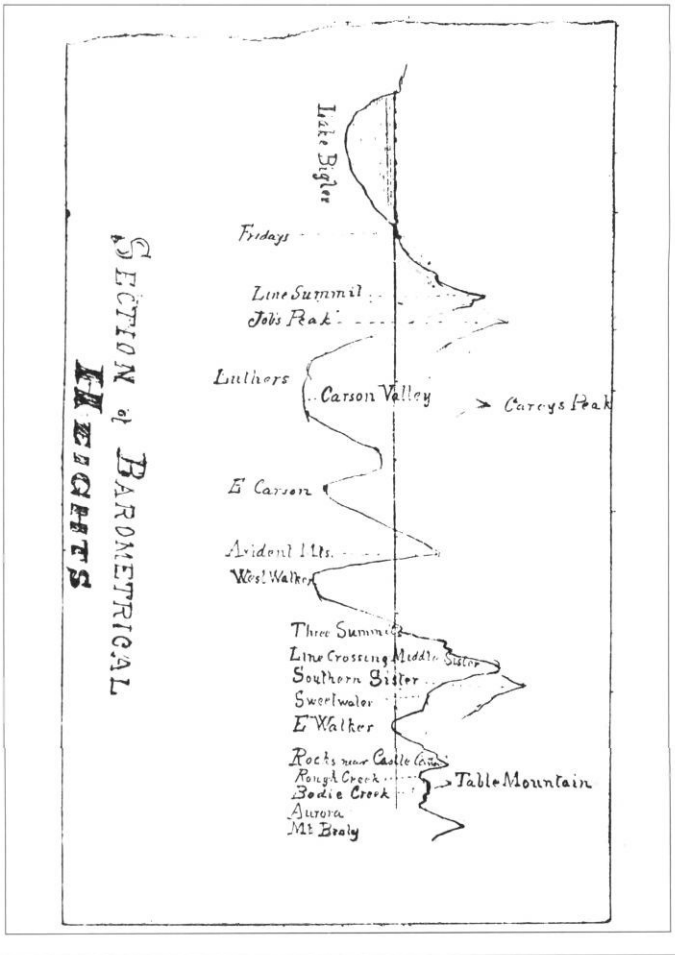
California Constitutional Convention of 1849

In October of 1849 a Constitutional Convention assembled in Monterey, former capital of the Mexican government. Forty-eight delegates met at Colton Hall to debate their visions of California. They were a diverse mix including Californios, American settlers, and miners. They were young, mostly, ranging in age from twenty-five to fifty-three. Some were fluent only in Spanish. One of many pressing issues on their agenda was to propose state boundaries to be submitted to Congress. For several days the delegates could not agree on where to establish the easterly state line. Some sought to include all of Upper California as the Mexicans knew it. This would have put the Great Basin and portions of present day Utah and Arizona in California. Others argued that it made more sense geographically and politically to run the line along the Sierra Nevada Mountains.

Arguments Regarding California's Size

Some historians speculate that those advocating the larger area were hoping for an eventual subdivision creating a new state to the south, which would allow slavery. Although nearly all delegates wished California to be a free state, their reasons were as diverse as their backgrounds: Some were morally opposed to slavery, some were miners who didn't want competition from slaves, and some were politicians who realized the U.S. Congress was unlikely to admit another slave state into the Union.

There were several compelling reasons to adopt the smaller proposition. For starters, a state the size of upper California would be nearly impossible to manage. Some delegates argued that to include the Mormons, who had settled near the Great Salt Lake several years earlier, would be a mistake because they were not represented at the Convention. Furthermore, some delegates didn't like the idea that such an enormous state would have no more



representation in the Senate than Delaware. They reasoned that allowing Upper California to develop into many states would eventually mean more political clout for the West.

California Described

Ultimately, the delegates agreed that drawing the line in the Sierra Nevada Mountains was the most practical solution. On October 11, 1849, James M. Jones, the youngest member of the Convention, offered the following land description. It was adopted and incorporated into the Constitution of 1849 and went on to define the boundaries of the 31st State.

"The boundary of the State of California shall be as follows: Commencing at the point of intersection of 42nd degree of north latitude with the 120th degree of longitude west from Greenwich, and running south on the line of said 120th degree of west longitude until it intersects the 39th degree of north latitude; thence running in a straight line in a southeasterly direction to the River Colorado, at a point where it intersects the 35th degree of north latitude; thence down the middle of the channel of said river to the boundary line between the United States and Mexico, as established by the treaty of May 13th, 1848; thence running west and along said boundary line to the Pacific Ocean, and extending therein three English miles; thence running in a northwesterly direction and following the direction of the Pacific coast to the 42nd degree of north latitude; thence on the line of said 42nd degree of north latitude to the place of beginning. Also, all the islands, harbors and bays along and adjacent to the coast."

Land Description Sets the Stage for Conflict

Unfortunately the delegates lacked the foresight of the people who drafted the Treaty of Guadalupe Hidalgo. The Treaty did more than describe the international boundary between the U.S. and Mexico; it required a commissioner and surveyor to be appointed by each government to run and mark the boundary line upon the ground. The results of this survey were to be deemed a part of the Treaty as if inserted therein. This requirement circumvented future disagreements based on conflicting interpretations of the intent of the written land description. Despite the presence

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California/Nevada - Continued from page 11

of at least one surveyor at the Convention, the delegates did not incorporate similar wisdom in their description of California.

President Zachary "Rough and Ready" Taylor and the U.S. Congress did not delay in welcoming California and her abundant wealth into the Union; California sprung into statehood on September 9, 1850 without undergoing probation with a territorial government. Yet without physical monuments to rely on, people living in the vicinity of the 120th meridian and the oblique line could not know with certainty if they lived in California or Utah Territory.

Challenges in Determining Longitude

One reason why California's eastern boundaries have been subject to dispute is the difficulty early surveyors had in locating geographic coordinates, especially longitude. Using lines of latitude and longitude was handy for the scrivener but the question as to where these lines fell on the ground was left to future generations. Of the two coordinates latitude is by far the easier to determine. It is the angular distance between the observer's horizon and the celestial pole. It can be measured by astronomical observations using relatively simple instruments. Longitude, however, is a horse of a different color. Longitude is the angular distance between the great circles of a reference meridian, such as that which passes through Greenwich, England, and the observer's meridian. It is a function of time. Although the rotation of the earth has no bearing on latitude it is has everything to do with longitude. Because the earth rotates 360 degrees every 24 hours and 4 minutes, (the extra 4 minutes per day is accounted for by February 29 during a leap year), the velocity of its rotation is about 1,200 feet per second at 39 degrees north latitude. In other words, at that latitude a clock error of 1 second would result in staking a meridian nearly a quarter of a mile out of position. Correctly determining longitude was a substantial challenge to 19th century surveyors.

First Effort to Locate California's Easterly Boundary

The first astronomical observations for determining the east boundaries of California were made in Placerville in 1855 by Surveyor General William Eddy. The crude protraction of the state boundaries on John Fremont's map was a function of convenience, not science, and they did not reveal to the residents of the Carson Valley upon which side of the line they stood. Eddy was a budget-minded civil servant and he knew it would be cheaper to make his observations close to home in Placerville. He determined the longitude of his position to be 120 48'11". The route from Placerville to the Carson Valley had been traveled enough by 1855 for the distance to be commonly known as at least 60 miles. Eddy's observations told him he was about 44 miles west of the 120th longitude. Without doubt, Carson Valley was in Utah Territory.

Carson Valley

One of the primary routes into California in the mid 1850's passed through the heart of Carson Valley. This fork of the California Trail traversed the Sierra Nevada via Carson Pass and was considered by many to be superior to the Stevens/Townsend/Murphy route, or what today is known as Donner Pass.

In 1852 John Reese and a handful of other ambitious entrepreneurs arrived from Salt Lake City planning to sell supplies to the emigrants. They established a trading post that came to be known as Mormon Station, which in turn gave birth to Genoa, Nevada's first town. It seems more than a little ironic that Nevada, today renowned for gambling and brothels, was founded by Latter Day Saints.

The merchants at Mormon Station began arguing for territorial status apart from Utah almost immediately. However, their case did not become compelling to Washington until the discovery of the Comstock Lode in 1859.

Early Surveys

Because of the enormity of the job, California's easterly boundary was surveyed piecemeal for the first twenty plus years after statehood. During that time money was only available to survey those portions along corridors of significant development. In 1855, civil engineer, George H. Goddard, working under California Surveyor General S.H. Marlette, undertook a survey to determine the eastern boundary of the state in the vicinity of Carson Valley. He made astronomical observations at Bigler Lake (Lake Tahoe) to locate the angle point in California's eastern boundary and discovered that the angle point could not be occupied because it fell within the lake. Using data on the location of the southeast terminus point of the oblique boundary line generated in 1852 by Captain L. Sitgraves, U.S. Topographical Engineer, Goddard ciphered the spherical angle between the 120th longitude and the oblique line. Unfortunately he never turned over the bulk of his work because he was never paid. The more things change; the more they remain the same.

Lt. Joseph C. Ives

The next round of astronomical observations at the terminus points of the oblique boundary line were performed by Lt. Joseph C. Ives of the Topographical Corps, U. S. Army. In 1858 he determined that the intersection of the 35th north latitude and the middle of the channel of the Colorado River occurred at longitude 114 degrees and 36 minutes west of Greenwich. Riparian boundaries can be troubling from a land title perspective because rivers move, and when the Colorado River moved it carried the terminus point with it. In 1861, Lt. Ives set a new northwest terminus point at Bigler Lake, and then promptly quit his job, joined the fledgling Confederacy, and waged war against his former employer. For obvious though perhaps irrational reasons, his work lost credibility with Washington.

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Nevada Territory

With the outbreak of the Civil War, the mountain of silver under Virginia City became critical to national security. Nevada became a Territory by Act of Congress on March 2, 1861. The scriveners of Nevada Territory's land description over estimated California's generosity because they included that portion of California easterly of the crest of the Sierra Nevada. The description reads as follows:

Beginning at the point of intersection of the forty-second degree of north latitude with the thirty-ninth degree of longitude west from Washington; thence running south on the line of said thirty-ninth degree of west longitude, until it intersects the northern boundary line of the territory of New Mexico; thence due west to the dividing ridge separating the waters of Carson Valley from those that flow into the Pacific; thence on said dividing ridge northwardly, to the 41st degree of north latitude; thence due north to the southern boundary line of the state of Oregon; thence due east to the place of beginning.

The nations of the world did not agree on using Greenwich, England as the universal reference for longitude until the end of the 19th century. It is interesting to note that this description was written measuring longitude from Washington, D.C.

Sagebrush War

Nevada Territory's land description set the stage for a minor civil war even though it acknowledged that the overlap would continue to belong to California until and unless she ceded it to Nevada Territory. These qualifying words did not stop Plumas County, California, and Roop County, Nevada Territory (now in Washoe County, Nevada) from exercising jurisdiction over the same ground in the vicinity of Honey Lake Valley. The powder keg exploded when the Roop County judge arrested the Plumas County justice of the peace. This outrage prompted the Plumas County sheriff to arrest the Roop County judge. Before long, shots were fired and blood was shed. Fortunately, a truce was declared before things got completely out of hand and each side resolved to petition their governor for an equitable solution. Clearly, it was time to put state line monuments on the ground.

Houghton and Ives Survey of 1863

In the spring of 1863 Governor Leland Stanford of California, and Orion Clemens, older brother of Mark Twain and Acting Governor of Nevada Territory, jointly appointed surveyors to mark their common boundary. Stanford appointed California Surveyor-General J.F. Houghton. Clemens chose Butler Ives as Commissioner for Nevada Territory. Everyone involved hoped this would put an end to further confusion.

The two chief surveyors hired John F. Kidder as Engineer in Charge of the field work and instructed him, per the Act of the California Legislature which authorized the survey, to mark a "transit line between the point of intersection of the 39th degree of north latitude with the 120th degree longitude west from Greenwich, near Lake Bigler, and the point where the 35th parallel of north latitude crosses the Colorado River, as the said points were established by Lieutenant Ives, Chief Astronomer of the United States Boundary Commission." They also instructed Kidder to run and mark "in the same manner all that part of the said boundary lying between first named point, near Lake Bigler, and due north from said point to the southern boundary of Oregon."

Twenty five thousand dollars was appropriated to mark the line. In the words of Surveyor-General Houghton, the California/Nevada boundary was "six hundred and thirteen miles long, over a rugged, mountainous country, through several tribes of Indians not known to be friendly,...passing through dense forests, over almost unexplored and uninhabited deserts with intervals of thirty, fifty, and eighty miles without water." With this sum, Houghton was expected to organize the project, hire technical consultants to cipher complex geodetic calculations, purchase equipment and supplies, pay his men's wages, provide and maintain a large train of pack animals, set cut stone monuments, prepare maps in triplicate, cover travel expenses, prepare reports, and settle all incidentals. Not surprisingly, twenty five thousand dollars proved to be inadequate to complete the job in its entirety.

John Kidder began the field work in late May of 1863 by recovering and occupying Lt. Ives' observatory at the south end of Lake Tahoe. There he made test observations for latitude. Finding his observations agreed substantially with Lt. Ives' work of 1861, he sent three members of his party to the north shore of the lake and put them on the meridian of the observatory by use of signal fires. After measuring westerly on the north shore of the lake to the 120th meridian, the entire party proceeded north to Oregon. They marked the line as they went.

By late July the surveyors completed their work on the 120th meridian and had returned to Lake Tahoe to establish the oblique line southeasterly towards the Colorado River. The oblique line presented a special challenge. It is a line

of constantly changing azimuth and therefore required the expertise of a geodesist. Houghton retained Professor J.E. Hilgard of the United States Coast Survey to provide the complex calculations that the field crew needed.

Election Day in Aurora

On Election Day in September of 1863 Aurora was the county seat for both Mono County, California, and Esmeralda County, Nevada Territory. The town was so close to the oblique boundary line that her citizens didn't know for sure which side it was on. Just to be safe they afforded themselves the privilege of voting both as Californians and Nevadans. If so inclined, a voter could cast a ballot for his favorite Californian at the Police Station, then walk down the street to Armory Hall and do likewise as a citizen of Nevada Territory. Instead of postponing the election until the arrival of the government survey party, which was approaching the area from the northwest and several weeks away, Aurorans preferred to make a public wager out of Election Day and elect two sets of officers. After the surveyors passed through politicians representing Mono County were promptly retired because Aurora was found to be inside Nevada Territory by approximately 3 miles.

After resolving Aurora's dilemma, Kidder continued southeasterly along the oblique line and soon encountered some five hundred Indians who were enjoying a seasonal celebration directly in his path. After communicating with the celebrants he decided to return to Aurora and wait out the festival before continuing with the survey. On the night of October 29th, while the crew was camped between Adobe Meadows and Aurora, a thirty-six hour blizzard began. Winter arrived in the high country and ended fieldwork for the Houghton-Ives survey of 1863.

Money Lacking

Snow wasn't the only threat to the Houghton-Ives survey because money was running out at the same time that the crew was shivering in camp. Most of the twenty five thousand dollars appropriated for the job was already spent and yet the work was not finished. The oblique line that the field crew was forced to abandon near Aurora was essentially a precisely calculated random line. Had the survey been completed as planned, Engineer in Charge John Kidder would have continued this line to its terminus as determined by Lt. Joseph Ives in 1861. There Kidder would have measured the falling between his line and Ives' position. With this data he would have returned along the oblique line to Lake Tahoe, applying appropriate corrections and resetting his monuments along the way. The oblique line would have then been marked from Lake Tahoe to the 37th parallel of north latitude, which until 1867 was Nevada's southerly boundary.

In his report to Governor Leland Stanford, Surveyor-General J.F. Houghton acknowledged that because the oblique line was not completed and corrected it could not be considered entirely accurate. He petitioned unsuccessfully for an additional twenty thousand dollars to complete the survey. In 1865 California and Nevada jointly commissioned John S. Lawson, who was a member of the survey of 1863, to extend the oblique line an additional 73 miles to the southeast. Lawson would not be the last surveyor to mark the line.

Daniel Major Surveys the California-Oregon Border

In March of 1867 Congress authorized a survey of "the 42nd parallel of north latitude, so far as it constitutes the common boundary between the States of California and Oregon." The General Land Office (GLO) hired astronomer and surveyor Daniel Major to execute the work. Major's instructions were to establish the intersection of the 42nd parallel of north latitude with the 120th meridian west from Greenwich and survey and mark the common boundary west to the Pacific Ocean. By 1870 his survey was completed and accepted by the GLO. Perhaps the first thing people noticed about his map was that he did not show the Houghton-Ives monument of 1863 at the northeast corner of California. However, he did plot topographical features common to those plotted on the earlier survey, and therefore government cartographers were able to establish a spatial relationship between the two. What they found did not look good. Careful comparison of the maps revealed a considerable difference of opinion regarding the location of California's northeast corner. This conflict was especially disturbing to the GLO because the public lands surveys were being closed on the Houghton-Ives line. If that line fell it would take other surveys with it. Matters would only get worse with time. Yet again, something had to be done.

Von Schmidt Survey of 1872-73

In June of 1872 Congress authorized another survey of the common boundary between California and Nevada. GLO Commissioner Willis Drummond hired astronomer and surveyor Allexey W. Von Schmidt to do the fieldwork. Over forty one thousand dollars was appropriated for the survey, so it seems that someone important learned a lesson

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from underfunding Houghton and Ives. Drummond had complete confidence in Major's location of the northeast corner so he instructed Von Schmidt to begin there and proceed south along the 120th meridian. Von Schmidt developed other plans.

In the spring of 1872 Professor George Davidson of the U.S. Coast Survey was in the Verdi area making observations to locate the 120th meridian in relation to the Houghton-Ives line. State Geologist J.D. Whitney and U.S. Geologist Clarence King requested his services to facilitate geographical surveys, which were being executed nearby. Davidson used telegraphic time signals and made independent calculations for the longitude. Von Schmidt was present for some of this work and was much impressed with Davidson's use of the telegraph. In fact he was so impressed he wrote to Commissioner Drummond and requested permission to use Davidson's location of the 120th meridian and run the line north to Oregon instead of south from Major's corner. He mailed his letter and went straight to work on this new strategy. By the time he received Drummond's negative reply he had already blazed about a hundred miles of flag line on his way north. The Commissioner was not pleased about this change in plans and ordered Von Schmidt to conduct the survey per the original instructions. Upon receiving the news, Von Schmidt dropped everything and headed for Major's monument at the northeast corner of the state. From there he surveyed south along the 120th meridian, setting monuments along the way.

By late September he had traveled far enough to encounter the northerly terminus of the line Drummond ordered him to abandon. It was over three miles easterly of the line he was currently on. That discovery must have been very discouraging. However, his faith in Davidson was unshaken so he stuck with the professor's opinion on the location of the 120th meridian. He returned to Major's monument, chained easterly, and set a new monument for the northeast corner of California. He then surveyed south along this line to the north shore of Lake Tahoe. At that point he dispersed his crew and returned to San Francisco for the winter.

Von Schmidt returned to the field in the spring of 1873 and set a cast iron state line monument at the north shore of Lake Tahoe. He made observations to locate the angle point in California's easterly boundary, and then made his

way along the oblique line to the Colorado River. When he arrived he found the river to be in a different place than where Lt. Ives found it in 1861. In his notes Von Schmidt indicated that he re-established the intersection of the 35th degree of north latitude and the Colorado River, and then corrected back along the oblique line all the way to Lake Tahoe.

During the course of his work Von Schmidt set cut granite monuments, and reset and remarked several of the obsolete monuments of the Houghton-Ives survey. He also set several other cast iron monuments similar to the one at the north shore of Lake Tahoe. Upon completion of the survey, GLO Commissioner Drummond accepted Von Schmidt's work and directed future public lands surveys to close on his lines. For a while there was peace in the neighborhood.

Disagreement at the Northeast Corner of California

In September of 1872 GLO Commissioner Willis Drummond hired Daniel Major to survey Nevada's northern boundary. Just as he instructed Von Schmidt several months earlier, he directed Major to use the monument of 1868 at the northeast corner of California as the initial point of the survey. Undoubtedly his intent in using this monument as a common point in the two surveys was to try and clear things up. The last thing he wanted was more trouble.

There is no evidence that Major and Von Schmidt crossed paths in the field, but if they didn't they may have just missed each other. Unlike Von Schmidt, Major used the 1868 monument as instructed. That's not surprising since he set it himself. It also comes as no surprise that he didn't like Von Schmidt's monument any more than Von Schmidt liked his. Major's map of 1873 showed Von Schmidt's monument at the northeast corner of California to be in error by some three miles. After so much effort and money spent, the citizens still had no satisfaction.

Grunsky and Minto Survey of 1889

By 1889 California was sufficiently suspicious of Von Schmidt's work that it was inspired to commission another survey. That year the Legislature appropriated five thousand dollars "to correct and establish" the oblique line. Surveyor-General Theo. Reichert hired C.E. Grunsky and

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William Minto, civil engineers, to make things right. Reichert instructed the engineers to tie into the new transcontinental control net established by the U.S. Coast and Geodetic Survey. The control net came along some years after Von Schmidt and likely brought its inaccuracies to light. One can only speculate on why so little money was authorized, considering that the Von Schmidt survey cost over forty thousand dollars sixteen years earlier. Perhaps the intent of the Grunsky-Minto survey was primarily to confirm the deficiencies in Von Schmidt's oblique line and thereby assist in determining if another full-blown effort was warranted.

The same Professor Davidson who helped Von Schmidt in 1872 helped Grunsky and Minto establish fresh initial points at each end of the oblique line. They surveyed a dozen or so miles of the line southeasterly from Lake Tahoe and then quit for lack of money. Now there was yet another line on a map already abundant with conflicting opinions. At the north shore of Lake Tahoe Von Schmidt determined Houghton and Ives to be about 3,100 feet west of the "correct" position. In turn, Grunsky and Minto concluded that Von Schmidt set his line about 1,600 feet too far west. Disagreements of a similar magnitude existed at the south shore of the lake and all along the California-Nevada boundary.

Coast and Geodetic Survey 1889 to 1893

Because of the continuing disparities, California pressured the federal government to find money to solve the problem once and for all. In 1892 Congress appropriated funds, but only for a survey of the oblique line. The following year the United States Coast and Geodetic Survey began the most precise survey yet. The U.S.C.&G.S. made astronomic observations to locate each end of the oblique line and connected the two points using a triangulation network. Running from northwest to southeast, they reportedly missed their closing station at the Colorado River by less than 500 feet. They corrected back along the entire line and set permanent monuments at calculated offsets from their temporary points. Along the way they discovered that Von Schmidt had not done similarly as he reported to the GLO. By locating many of his monuments they ascertained that he corrected back only about 1/3 of the way to the lake. There he intersected his random line and put an unauthorized kink in the boundary. At no point did he faithfully trace the inverse between his astronomic positions at each end of the line.

The U.S.C.&G.S. survey was in progress from 1893 to 1899. It had the best resources and most advanced technology of any survey up to that time. Finally, there was a highly accurate and well-monumented boundary between California and Nevada. At least between Lake Tahoe and the Colorado River.

Resolving the Conflict Once and For All

In 1977 California brought suit against Nevada in the United States Supreme Court. The time had come to establish their common boundary with certainty and eliminate potential confusion regarding tax collection and other issues of jurisdiction. Since 1873 both states acquiesced to the Von Schmidt line north of Lake Tahoe. The problem was that neither state's legislature enacted statutes adopting the Von Schmidt line. Despite the fact that almost no one knew where it was, the Houghton-Ives line was still the official boundary from Lake Tahoe to Oregon.

The oblique line as surveyed by the U.S.C.&G.S. did not figure into California's initial argument because, unlike the Von Schmidt line, it had been adopted by both states by statutes. It was known to be substantially accurate and well monumented. Since 1899 it had been accepted without reservation by both states. On the surface the situation

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looked much better than along the 120th meridian, but before the conclusion of litigation the location of this line would be argued as well.

Along with questions about tax collection and jurisdiction there were also land title issues regarding state school and selection lands between the lines marked in 1863, 1873, and 1899. Some federal lands acquired and subsequently sold by Nevada were eventually found to have belonged to California. Consequently, Congress enacted a law that protects the property rights of parties whose chain of title emanated from the wrong state.

Litigation Intensifies

As the litigation got into full swing, claims and counter claims flew about with a level of intensity that no one anticipated. Once shaken from her complacency, Nevada had no problem generating creative alternatives. Her primary argument was for the Houghton-Ives line, even though its very existence was unknown but to a handful. Another suggestion was to extend a line south to Lake Tahoe from the 1868 Major monument at the northeast corner of California. One alternative offered for the oblique line was based on the work of Houghton and Ives. Another was based on Von Schmidt, which is interesting since Nevadans considered him an "officious intermeddler" who caused them to lose land to California. In short, all of Nevada's suggestions would have pushed the common boundary to west. California's counter argument was to resurvey the entire line from Oregon to the Colorado River using state of the art technology and then adopt the new line as official once and for all. This would have pushed the boundary somewhat into Nevada with the result of annexing several casinos. An assemblyman from Long Beach sponsored a bill that would have exempted those casinos from California's anti-gambling laws.

Peace at Last

In 1980 the Supreme Court of the United States decreed that the boundary between California and Nevada would consist of the Von Schmidt line as marked between Oregon and the north shore of Lake Tahoe, and the U.S. Coast and Geodetic Survey line as marked from the south shore of Lake Tahoe to the Colorado River. In essence, things were to remain as they had been since the 19th century.

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AMERICAN CONGRESS on SURVEYING and MAPPING
National Society of Professional Surveyors, Inc.
Annual Map/Plat Competition
Las Vegas, NV, March 18, 2001

OFFICIAL ENTRY FORM

The 2001 ACSM/NSPS Map/Plat Design Competition is now open for entries.

This will be a juried contest. A maximum of five maps per style and category will be selected and exhibited at the Annual Conference in Las Vegas, NV. No more than one entry per category should be submitted by the state surveyor association affiliates of the National Society of Professional Surveyors, Inc. (NSPS). Entrants need not be members of NSPS. A member of NSPS must sponsor the map, plat, or project under consideration and their name must be so noted on the nomination form. The entry must have been completed after June 30, 1998 and may not have previously been entered in this contest. The entry may be freehand, machine drafted, or computer drafted.

Submit six prints for each entry with a maximum map size of 34" by 44". ***Entries must be folded to fit in a 9" by 12" envelope.***

Submissions must be a single drawing; it may originate as part of a set of drawings, however, it must be entered as a single sheet. ***All entries must be postmarked by December 31, 2000. Use one entry form per document submitted.*** An entry fee of $20.00 must accompany each form. The committee will notify the winners to send a print for display at the conference.

All entries will be judged on adherence to the minimum standards as set forth by NSPS. The judges will consider interpretability, content and layout of data shown, presentation, innovation, applicability to typical client or persons using this type of map, and correctness. Neatness and accuracy of scale will also be considered. Prizes will be given in categories where three or more entries are received. The decisions of the judges are final.

Categories

1. Subdivision Plats . . . . . ☐
2. Boundary/Cadastral Maps . . . . . ☐
3. Topographical Maps . . . . . ☐
4. ALTA/NSPS Survey Maps . . . . . ☐
5. Miscellaneous Maps . . . . . ☐
6. Color Presentation-Plans & Maps . . ☐
   (All Categories)

(Only one Category may be checked)

Submit entries with this to:

ACSM
NSPS Map/Plat Contest
Attn: Patricia Canfield
5410 Grosvenor Lane
Bethesda, MD 20814-2122

(Use one entry form per document submitted)

This form may be reproduced for use in submitting additional entries

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An entry fee of $20.00 must accompany this form.
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Title of Entry: _____

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I give my permission for this entry to be placed on display at any ACSM or NSPS sanctioned exhibit on cartography or map design. Also, I understand that entries may be reproduced in any ACSM or NSPS sanctioned publications, that winning entries may be duplicated, reproduced, or copied and sold by ACSM or NSPS, and that the winning contest entries may be placed in the map collection of NSPS at the Michigan Museum of Surveying. No entries will be returned. The decisions of the judges are final.

Signature: _____ Date: _____

For office use only: Map/Plat Contest Entry Number: _____

Workplace Ergonomics - Continued from page 9

The real danger in downplaying this type of injury is the fact that early identification, diagnosis and treatment are clearly the best way of mitigating the effects and keeping them from becoming chronic injuries. In addition, acknowledgement of the potential serious human health and economic effects of these injuries to both worker and employer alike can lead to proactive approaches that effectively minimize occurrence of RSI.

Prevention and Treatment

Employers and their workers can significantly impact the occurrence of RSI by partnering to redesign both the workplace and the way in which the work to be done is performed. Employers can also minimize the damage done by RSI by supporting early and aggressive treatment approaches when such injuries do occur. From a human standpoint, the benefits of preventing these injuries are obvious. From an economic perspective, the benefits are also obvious, with a recent example being a Norwegian company calculating that their proactive prevention program reduced RSI occurrence and produced direct and indirect cost savings of 840% return on investment.

From a prevention perspective, Workstation Ergonomics are a key area of focus. The following is intended to provide a brief checklist of critical workstation factors:

Right-angle Rule

The basic principle is that an ergonomically sound workstation involves right angles, feet flat on floor, calves perpendicular to floor, thighs parallel to floor, 90 degree angle between thighs and back. Arms should hang relaxed at side, forearms straight out at 90 degree angle, wrists straight.

Armrests

Adjustable armrests provide well-padded support to arms while they are outstretched to keyboard.

Monitor Placement

Head should be 18-28 inches away from screen and monitor should be adjusted to height that allows for maintenance of neutral head position with eyes focused on middle of screen.

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Alternate Input Devices

Split keyboards, adjustable keyboards, chord keyboards, voice recognition software, trackballs, trackpads, etc. all can potentially be considered as alternative methods for reducing wrist, hand and digit stress while inputting.

Wrist Pads

Wrist pads help to position your wrists properly while keyboarding and rest them on a soft surface when not typing.

Chairs

Chairs are the most important and they are different for each individual. Comfort is the key. They allow workers to maintain the Right Angle Rule. Armrests are adjustable and provides good lumbar support.

Worker

All of the equipment and devices noted will not be helpful if not utilized properly by the worker. It is therefore critical that the worker understands the principles underlying the ergonomic adjustments that are necessary for ***them***. Then they must take responsibility for their own well being while performing their job duties.

In the event that an RSI does occur, worker and employer are encouraged to work together cooperatively to address the situation constructively. Prompt medical attention can prevent an injury from becoming a chronic condition. Adherence to medication regimes, use of braces, splints, application of ice and periods of rest may be necessary. The worker and employer can continue to be proactive by reassessing ergonomic considerations noted herein which may need to be implemented or modified. The worker who is able to become an active participant in their own treatment is the one most likely to obtain the full benefit of appropriate treatment modalities. In some instances this may mean exercising the prudence to restrict activities when indicated and increasing activities when the time comes to do so.

There are many complexities to the treatment of RSI injuries. Unfortunately, these injuries can become chronic

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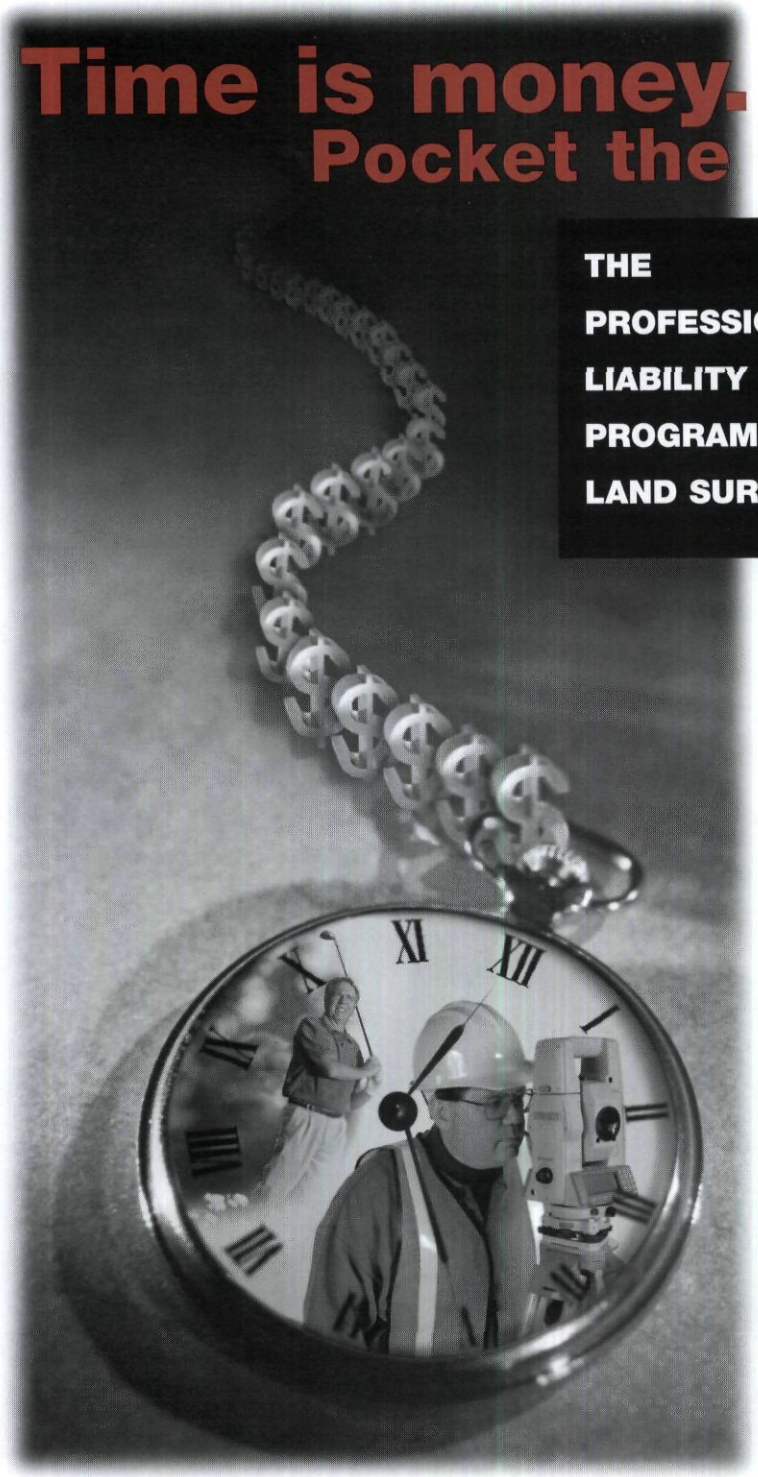

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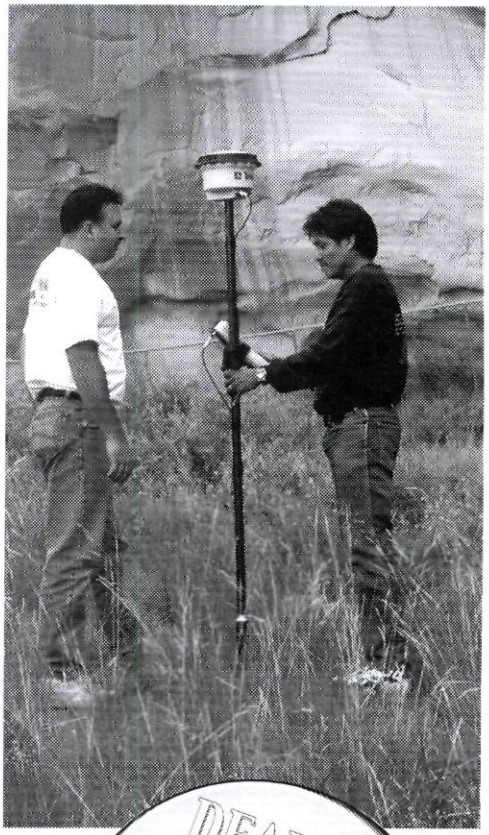

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Workplace Ergonomics - Continued from page 22

and non-responsive to conservative methods of treatment. Extensive periods of lost work time, chronic pain, severe restrictions of upper extremity activities can result in surgical intervention becoming a necessary treatment option.

It is for this reason that it is so critical that the emphasis be on ergonomics, prevention and early identification and treatment as key to stem the rising tide of RSI. Although the statistics show that the nature of the work that is now performed by Professional Surveyors is such that RSI is a significant risk and can expose those performing the work to this type of injury, significant benefit can be attained with a commitment by both employer and worker to minimize the conditions that can lead to these injuries.

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Here are a few internet sites that provide extensive information and also links to a broad range of sites with relevant information:

www.ctdrn.org: Compendium of RSI/Ergonomic resources, links.
www.workpace.com: Ergonomic software.
www.ergoweb.com: Ergonomic resources, products, links.
www.rsi.deas.harvard.edu: Broad range of occupational health & safety, ergonomic, medical and RSI resources and links.
www.stretching.com: Stretchware, CD-ROM software reminding computer user to take breaks and exercise.

Lou Antonelli, M.S., is a Certified Rehabilitation Counselor and Independent Vocational Evaluator for the State of California , and an Expert Witness with over twenty years in private practice. He has instructed at San Francisco State University and has provided Disability Management consulting services for numerous employers in the western states including such entities as Bank of America, Agilent Technologies, Hewlett Packard and is currently facilitating diversity training for the ILWU, Pacific Maritime Association and Southern California Edison.

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California/Nevada - Continued from page 19

The Court also allowed the states to determine the location of the angle point inside the lake, which they did shortly thereafter by using monumentation provided by the National Geodetic Survey. After 80 years of doubt and disagreement there was peace in the neighborhood.

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Special thanks to Francois D. Uzes, LS, and Judge James Thompson. Without them this article would not have been possible.

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The goal of the California Land Surveyors Association is to promote and enhance the profession of surveying, to promote the common good and welfare of its members, to promote and maintain the highest possible standards of professional ethics and practice, and to elevate the public's understanding of our profession. CLSA represents all Land Surveyors, whether they are employees or proprietors, whether in public or the private sector.

Representation

■ LOCAL: Your local chapter represents you in local issues. Through your chapter representative to the State Board of Directors, the individual member can direct the course CLSA will take. ■ STATE: The Surveyor is represented at the state level through an active legislative program, legislative advocate, and liaison with the State Board of Registration. ■ REGIONAL: CLSA is an active member of the Western Federation of Professional Surveyors. This Federation is composed of associations throughout the western United States and addresses regional issues. ■ NATIONAL: Through institutional affiliation with the National Society of Professional Surveyors and the American Congress on Surveying and Mapping, CLSA is represented at the national level.

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CLSA presents annual conferences which provide technical and business programs, as well as exhibits of the latest in surveying and computing technology. Seminars and workshops are presented to assist in continuing education. CLSA publishes the California Surveyor magazine and the CLSA NEWS to keep the membership abreast of changing legislation, legal opinions, and other items which affect our profession.

Business and Professional Services

CLSA provides a fully staffed central office which is available to answer questions or to provide up-to-date referrals concerning legislation, educational opportunities, job opportunities, or other issues concerning our membership. Professional liability insurance programs are available to members.

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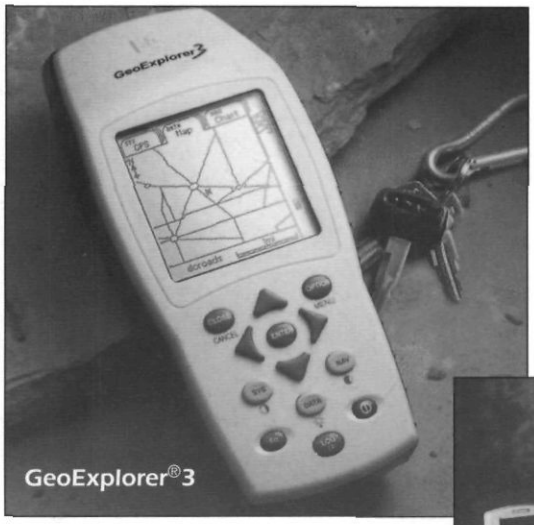

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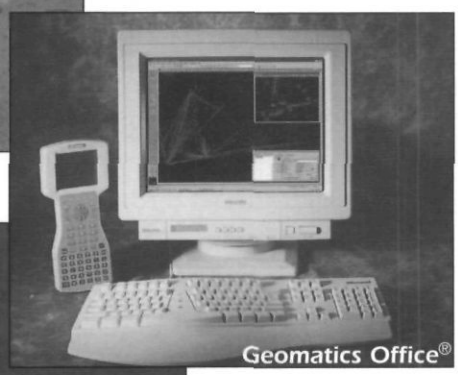

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