Abbreviation Key:

VP  Vice President
IR  International Representative
BM  Business Manager
GF  General Foreman
St  Steward
J   Journeyman
Ap  Apprentice
VIP Veterans In Piping program
The Ivanpah Solar Field—Concentrating the Sun’s Energy

It’s sunrise in the Mojave Desert, approximately 50 miles northwest of Needles, California, (about five miles from the California-Nevada border) on federal land managed by the Bureau of Land Management, as we drive past fields of flattened heliostats. As the sun rises, the heliostats—which are mirrors, not solar panels—will tilt back and swivel to track the sun and concentrate sunlight onto a boiler filled with water that sits atop a tower. When the sunlight hits the boiler, the water inside is heated to create high-temperature steam, which is used in a conventional steam turbine generator to produce electricity. BrightSource Energy’s LPT solar thermal system is so impressive, and it has been deployed to make up the 377 mega watt net Ivanpah Solar Electric Generating System.

Steve Boise (J, Local 250), Bob Lamb (IR), John Piatti (J, Local 403), Sid Stolper (UA VP District 5 and BM District Council 16), Bob Regalado (Bechtel Labor Relations), Gene Glover (St), Richard Edwards (BM), Bob May (Deputy Site Manager, Bechtel)
The project, which touts NRG Solar, Google and BrightSource as equity investors (referred to as Solar Partners), is currently the largest solar plant under construction in the world. Ivanpah started construction in October 2010, and in 2013 it will deliver peak power to 140,000 homes to serve the company’s signed contracts with PG&E and Southern California Edison. Employed by Bechtel, UA journeymen and apprentices have made up the majority of the workforce, and they have become a critical component to the success of this project. Manning this project was a colossal challenge. Overall craft manpower peaked at 2,200, manning a day and night shift rotation; 687 were UA piping professionals from District Council 16 in California and beyond. It was noted that the Ivanpah project would generate approximately $650 million in wages and employee earnings over the facility’s first 30 years of operation.

Richard Edwards, Business Manager from Plumbers and Pipefitters Local 364, Colton, California, stated, “This job just didn’t happen. We partnered with the IBEW and CURE throughout California. All of these projects have been CURE projects.” District Council 16 Business Manager and UA Vice President of District 5 Sid Stolper added, “CURE is a coalition of unions whose members’ mission is to help solve the state’s energy challenges by building, maintaining and operating conventional and renewable energy power plants. The UA workforce we
have brought on to these projects has performed above and beyond. This has enabled us to do projects like this. It has been an unquestioned success. Everywhere I go, owners and contractors are raving. I always get thanked for the quality the UA provides. This particular project is a great example of this initiative and of the UA tripartite approach.”

Brother Edwards continued, “As partners, the UA, Bechtel, and Solar Partners were all on board. There was a lot of communication and cooperation from all of us to move this project forward. We utilized our Standard for Excellence program successfully, we hired locally, and we reiterated that we work in partnership with our contractors. There was a lot of pre-job planning that involved the Bureau of Land Management. This is a very environmentally friendly project. Great care was taken to ensure the protection of the desert tortoise, as well as protecting native vegetation (see side article). To that end, it took about two-and-a-half years to get the project started, and then we had to man up. Manpower participation involved just about every local in District Council 16. We pulled a lot of craftsmen from our sister locals in California. We pulled from Las Vegas, Local 525. Their work had slowed down, and this project came up, which was a great thing. Our local has a lot of work going on right now—five power plants to be exact—so we definitely needed the support from our sister locals to man this project.”

The solar field consists of three 459-foot towers built on 3,500 acres. The towers are roughly two miles apart, although once onsite the distance is deceiving, and the towers appear much closer. Surrounding the towers,
referred to as Units 1, 2 and 3, the heliostats fan out. There will be 60,000 heliostats surrounding Units 2 and 3, and 53,500 heliostats surrounding Unit 1 when all Units are completed. The heliostats are assembled in a building onsite. They are transported to the field with a tractor to stage them. Ivanpah currently has nine cranes setting heliostats. Due to the winds being calmer at night, a night crew has been added to expedite installation. To install the heliostats, pre-drilling is done with augers, in essence “punching” the base into the ground through vibration, leaving behind a tiny pile of dirt. This low-impact process allows the heliostats in the field to correspond to the area’s natural contours and eliminates the need for foundations and concrete pads in the field. Upon completion in 2013, there will be a total of 113,500 software-controlled heliostats to reflect the sun’s light onto the “solar receiver steam generators” (SRSGs) or boilers sitting atop the three towers.

The SRSGs are located on the top of the towers. Concentrated sunlight hits the panel or water wall and flows through it, heating the boiler’s pipes to over 1,000 degrees Fahrenheit, which produces super-heated steam, and at that instant—the tower becomes a power plant. Steam is then piped from the boiler to a standard steam turbine generator, which is located at the bottom of the towers where electricity is produced. BrightSource’s technology is extremely efficient at producing higher temperature and pressure steam, which allows BrightSource’s system to transform solar energy into a dispatchable and cost-competitive resource.

A gas pipeline supports an auxiliary boiler that allows a rapid heat-up of the boilers in the morning, expediting the startup of the plant in the morning. The process is fairly simple and has been described as an inside-out boiler. There is a lot of pipe in this Bechtel-designed system—54,000 linear feet (lf) of large-bore pipe, 48,000 lf of small-bore pipe, and 75,500 lf of underground pipe that the UA was responsible for. The UA has also been responsible for the Riley Boiler piping. Floors nine and up contain pipe with an average length of six feet. When you look at the boiler, tubes are visible on the outside. Typically they would be on the inside. At Ivanpah, it is backwards, which made this project unique.

Once up and running, transmission lines will carry a total of 377 megawatts net of power to Californian homes and businesses. Ivanpah will be celebrated as it draws its fuel from the sun, instead of using conventional fossil fuels to create steam to turn the turbines. The result will reduce carbon dioxide emissions by more than 400,000 tons per year.

International Representative Bob Lamb added, “By integrating conventional power block components, such as turbines, with BrightSource’s state-of-the-art proprietary technology and solar field design, electric power plants using its systems can deliver cost-competitive, reliable, and clean power when needed the most.”

The transmission lines are coming from the Hoover Dam. Old lines are being pulled down, and new ones are being erected. Bechtel was involved in the original construction of the Hoover Dam as part of the team referred to as...
Six Companies Incorporated. This upgraded line now connects generations of technology together—the Hoover Dam and the Ivanpah Solar Project.

All three units (towers) are monitored from one building. There are two mirrors to a heliostat, and the heliostats are constantly being adjusted to ensure that they make the most of the sun’s energy. Aboveground cables crisscross each solar field. The technology for each heliostat is enclosed in a control box housed on each heliostat. Sensors monitor the heliostats’ positions. If the wind kicks up to a pre-determined speed, the heliostats will automatically lay flat. Weather stations are a critical part of these solar fields.

Maintaining the heliostats involves keeping the mirrors clean of debris. Mirror washing machines will be deployed to clean the mirrors regularly. The water is recycled from each unit, which minimizes water waste and pollution.

At the time of our tour in February, Unit 1 was in start-up mode and had already generated steam. Unit 2 was 93 percent complete, and Unit 3 was 87 percent complete. It is anticipated that the field will be turned over to the grid in a phased-in approach starting with Unit 1 in November, followed by the other units’ phasing-in within eight-week increments. By May, the operation will be doing steam blows, and the manpower will be down to roughly 100 people.

Bob Regalado, Labor Relations, Bechtel, stated, “The UA played a large role in this project given the uniqueness of the project. We will be producing power here soon, and that lends to all of the crafts’ credit, pipefitters in particular. We have a strong partner-
ship with Local 364 and District Council 16. We had to staff up rapidly. They worked with us in a very expeditious way to make sure we had plenty of capable welders. We have had strong leadership in Foreman and General Foreman, and our lead General Foreman, in particular, helped pull it all together for us. Bechtel has a lot of its leadership who have come from the trades. These are people who know pipefitting firsthand. We like to have them on hand, so that they can lead in an appropriate way. The success of this project will provide an opportunity to build a lot more like it.”

Bob May, Deputy Site Manager for Bechtel and former Pipefitters Local 449, Pittsburgh, PA, member, has been on the road for Bechtel for 24 years. He stated, “The job is going very well. It is about 93 percent complete. The UA was about 30 percent of the entire workforce here. We still have 360 pipefitters onsite. They are doing a very, very good job. The quality is excellent. We have had three boiler hydros with zero leaks—that is almost unheard of in the industry. I’ve been doing this a long time—38 years—and I don’t know if I have been on a project with three boiler hydros with zero leaks. It’s very impressive, and we take a lot of pride in that. Safety and quality—we all agree they are number one and two. We have worked six million manhours without a reportable incident. That is incredible.

“The large piping from the air-cooled condenser was assigned to the pipefitters. It is not traditional piping that pipefitters do (it was originally assigned to the boilermakers through the agreement). It is not seam piping. It is built in segments. They had to learn this technology. They picked it up on Unit 2 and then came in and did Unit 3. The UA has always been great at adjusting to required skill sets. The local found the guys who have done this work in the past and brought them in. They, in turn, mentored the others with their expertise. That showed flexibility. Once the UA is assigned work, they train and work hard to perfect it. The UA training program plays a huge role in UA journeymen and apprentices’ capabilities. Whenever you have truly skilled craftsmen coming out of an organized training program, they become invaluable.”

Senior Pipefitter General Foreman Scott Jahnke has been out here for 27 months. He is a 36-year member of Local 364. “This is the largest commercial solar plant in the world,” said Brother Jahnke. “With California’s mandate for renewable energy, it is opening the door for everyone out here. It is a flagship job; we have a lot of craftsmen from all over North America who really want to be involved with this new technology. Working here will offer them some valuable experience. Our guys are working on 400-foot-plus towers, on inside-out boilers. It is like a vertical pipe rack, not a horizontal pipe rack. It is a challenging job. There is nothing else like it. It takes skilled professionals to install the pipe and weld it to make it work. The UAs training gives them the academic and hands-on training, the skill level and experience you can’t
Bechtel Team working on Unit 3

Gene Glover (St), Scott Jahnke (GF and President Local 364), Richard Edwards (BM), David Kirk (VP Local 364)

Eugene DeLaGarza (J), Delano Paul Martin (J, Local 230), Manuel Olivas (J)

David Sinclair (J, Local 494)

Bob Lamb (IR), Kyle McMahon (Local 364 VIP apprentice), Sid Stolper (VP District 5, BM District Council 16)

Jason Brosius (J)

Bechtel Team working on Unit 3
get anywhere else. There is still a need for what we produce out here. Bechtel is happy with us. We have provided the best manpower. The hiring hall has been a network to get the best welders out here. It is always challenging to pull guys from all over. Everyone has a different skill set, but we have successfully combed through and have sent the best guys to the job. Pipe is pipe. We learn and adapt. We build things. I am very proud to be out here.

Bechtel representatives have been forthcoming in commending the UA’s leadership. In addition to Brother Jahnke, Gene Glover, Steward, has been on the Ivanpah job for two years. He stated, "I've been working on the rerun fuel gas line for the auxiliary boiler from the tie-in to the common area to Unit 1. Lines will go to each unit to power off of natural gas. I also worked at Acciona Energy’s Nevada Solar One where they built the original plant with parabolic trough technology. I will be out here until the end. I’ve been in the industry for 35 years. Business Manager Richard Edwards, Scott, and myself all started on
The Gift of Stewardship

The Ivanpah project has taken a proactive approach to protecting the threatened desert tortoise by building a head start facility and employing experienced biologists to complete research. It is estimated that the Ivanpah project owners, known as Solar Partners (NRG, Google and BrightSource) have spent $22 million caring for and translocating the elusive desert tortoise. Originally it was thought that there were not a lot of tortoises in the area where the state-of-the-art solar thermal project was planned. More tortoises were found than original estimates indicated would be in the area. The Bureau of Land Management (BLM) reinitiated consultation with Solar Partners to produce a new biological opinion, while state and federal agencies devised a plan that everyone agreed on.

Since its inception, the Ivanpah tortoise translocation and head start program has been a godsend for biologists who have been given the unique opportunity to study the threatened species. They have painstakingly kept records of each and every tortoise. Their efforts have been commendable, and quite frankly, the extent to which Solar Partners is helping to facilitate the rebuilding of the desert tortoise population in the Ivanpah Valley area is admirable. So far this spring, 57 tortoises have been moved back into their home range in the Ivanpah Valley. The biologists have been watchful that each tortoise’s translocation will remain well within its home range in a habitat that has familiar soil composition, food sources, weather and terrain. There is a set protocol that must be adhered to for the release of each tortoise. Each tortoise’s health is assessed to ensure it is healthy, and they must be fully hydrated. Biologists are scheduled to monitor each tortoise every day for a week to ensure the tortoise is properly acclimating to its new surroundings. They will then check on them once a week during their active season and then twice a month during the winter season when the tortoises are safely in their burrows.

In the wild, the desert tortoise has many predators, and only about two percent of desert tortoises survive to adulthood (reproductive age). Ivanpah’s head start program has, no doubt, given a boost to the juvenile tortoise population. Hatchling and juvenile tortoises are released once they reach a larger size, making survival more likely when translocated into the Ivanpah Valley. California’s goal of generating a third of its power from renewable sources by 2020 will only be a success story if these projects can be built. Biologists are doing all that they can to ensure the safe translocation of the desert tortoise. The plight of the desert tortoise involves so many factors. Solar Partners is going to great lengths to ensure minimal impact to the desert tortoise population at and near the Ivanpah project site. In the end, the information gathered at the Ivanpah project will help the desert tortoise community learn more about the species, which will provide valuable information that will help the species once again flourish. The goal in five years—for everyone involved—is for the biologists to walk away leaving behind a viable desert tortoise population.