

# ATMOSPHERIC RIVERS

Understanding the odd weather phenomenon that caused the October 23-25, 2021 storm event.

The Monthly Dirt  
A monthly newsletter on the California  
Construction General Permit

**The recent atmospheric rivers in California set a new all-time rainfall record for October. In this article, we discuss these relatively new types of severe rain events.**

## WHAT ARE “ATMOSPHERIC RIVERS”?

“Atmospheric river” only became part of our vernacular relatively recently, and describes a narrow corridor of concentrated moisture in the atmosphere which can result in extreme precipitation and flooding. For those of us on the West Coast, atmospheric rivers have their origins in the warm tropical waters surrounding

According to a recent article in the San Diego Union-Tribune, federal forecasters estimate the atmospheric river storms of October 23-26 dropped 7,600,000,000,000 gallons of rain on California. And for those of you wondering if the term “atmospheric river” is an accurate description of these storms or not, here’s an interesting fact: the amount of water generated by this storm in 48 hours is identical to the amount of water discharged by the Amazon River in 42 hours and 12 minutes. That much water could cause significant trouble for construction sites.

Hawaii, giving rise to an older term you may have heard: “Pineapple Express.” The warm oceans generate considerable amounts of evaporation, which transforms into a long narrow band of concentrated moisture—usually only a few hundred miles wide, but thousands of miles long. When this band of moisture reaches landfall, it produces significant precipitation—meteorologists say up to half of California’s annual rainfall comes from atmospheric rivers.

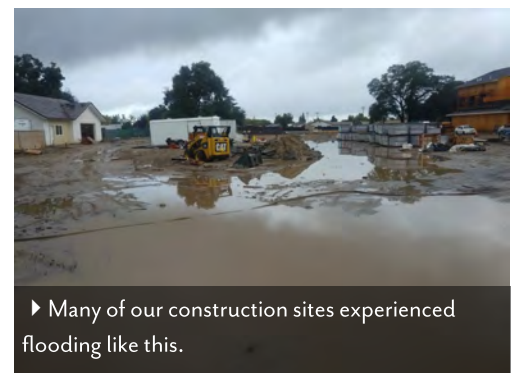
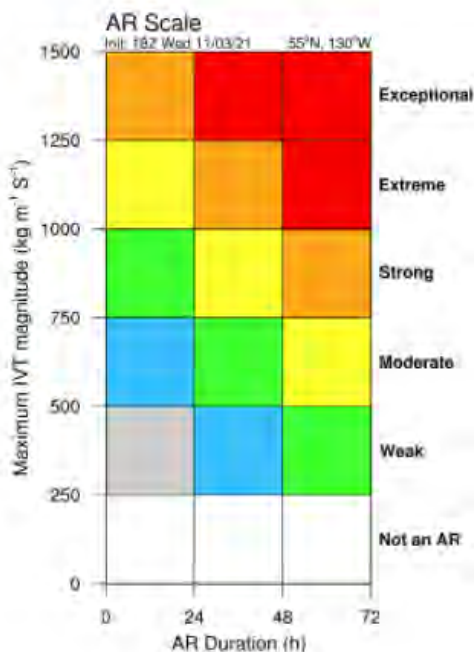
General Stormwater Permit, you may recognize the “100-year, 24-hour event” description from the design storm standards. But those of us in the Construction General Permit have something similar in the Post Construction requirements, which mention designing structural control measures for 85th percentile storm events. This refers to the maximum rainfall amount generated by 85% of the storms in a given area.

Not all atmospheric rivers are disastrous; in many cases they can help alleviate the seemingly never-ending drought in California. In 2019, the Center for Western Weather and Water Extremes released a five-level scale to categorize these atmospheric river events, similar to hurricane categories. The October 24, 2021 atmospheric river reached Category 5 status near Point Reyes due to the amount of precipitation and the duration (63 consecutive hours).

100-year storms have a 1% chance of happening in any given year. But, saying a storm of a certain size is a “100-year storm” only refers to the likelihood of that storm happening; it doesn’t govern how often that storm actually could happen. For instance, some places in California have received 100-year storms five times in the

## UNDERSTANDING X-YEAR STORMS

Another concept that can be misleading is the practice of referring to storm events and floods as “100-year” or “500-year” events. If you have any knowledge of the Industrial



► Many of our construction sites experienced flooding like this.





▶ Heavy sheet flow undermined a row of compost socks and eroded a series of gullies on this hillside.

last ten years.

But to make things more confusing, 100-year storms don't necessarily cause 100-year floods. And even more importantly, our weather records only go back about 200 years, which means that we don't actually know what a 500-year or 1,000-year storm looks like in California. But meteorologists are saying that California is due for a big one soon.

### POTENTIAL IMPACTS TO YOUR SITE

Amazingly, the 5+ inches of rain we received on October 24th resulted in surprisingly minor damage, considering the fact that many sites received a third of their average annual rainfall in a single day. This could be due to our drought-stricken California soil having the capacity to absorb much of the rain water. But atmospheric rivers can really cause problems at construction sites, especially if the ground is already saturated from past rainstorms.

During the October storm, we saw significant



▶ Severe ponding at a local subdivision site.

erosion happen on even well-prepared project sites. Deep gullies undermined compost socks, heavy sheet flow washed away blown straw, and drainage culverts created 20-foot-deep gullies in hillsides. Not to mention the widespread flooding we observed at almost every site.

But remember that atmospheric rivers come in all different sizes and durations, from beneficial to downright hazardous. The amount of damage and BMP failure at your site depends on a variety of factors – how wet is the soil? How much rain is expected, over what period of time? What type of soil are you dealing with on site? It's possible that a small atmospheric river will result in nothing more than some minor runoff... which leads us to:

### PREPARING YOUR SITE FOR ATMOSPHERIC RIVERS

It's important to note that the Construction General Permit does not relax regulations for extreme storm events. But if you're like most construction sites in California, no matter how much you prepare, you'll never be equipped to handle a storm event like the one we experienced in October. Flooding, erosion, and NAL exceedances are probable if not inevitable. So, how can you as a CGP permittee prepare?

First, make sure you are in compliance with all of the CGP requirements for your Risk Level, and that your site is generally ready for rain.

By now we sound like a broken record, but good housekeeping is probably the single most effective BMP—if your site is clean and tidy, and all of the BMPs described on your SWPPP Map are in place and properly maintained, you're going to be in good shape. Are all inactive disturbed soil areas stabilized? Are your inactive stock piles covered? Remember, stockpiles need to be covered when not in use; disturbed soil areas not scheduled to be active for 14 days or more need to be effectively covered or stabilized. Stabilize storm water swales to minimize erosion, check your perimeter controls, and cover your waste bins, concrete washouts, liquid storage, and other potential pollutant sources. You should also inspect the drain inlets and discharge points and make sure they are clean. Your track-out controls may also need some attention as well. Check out last month's issue of *The Monthly Dirt* for more ways in which you can prepare your site for rain.

Also, keep an eye on the weather forecast and be aware of forecasted atmospheric rivers. The more advanced notice you have of an extreme storm event, the better you can prepare your site. You might also think about creative ways to schedule work that could minimize erosion and erodible surfaces at your site.

### CONCLUSION

If the current trend of warmer oceans continues, scientists predict that atmospheric rivers will become more common and more severe in California. Unfortunately, there's only so much you can do to prepare for an extreme storm event. Even the most prepared site has a limit of how much rain it can withstand before experiencing catastrophic BMP failure.

Do the best you can to prepare for the storm, and don't forget to practice good housekeeping!

**Please contact us if you have any questions ...**

### The Monthly Dirt

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A person wearing a red jacket and a backpack stands on a grassy mountain ridge, looking out over a vast, misty mountain range. The sky is overcast and the mountains are partially obscured by fog. The overall mood is serene and contemplative.

# DON'T FORGET

This Thanksgiving, take time to remember your blessings.

Happy Thanksgiving from The Monthly Dirt staff.

Psalm 103:2

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