Dr. Robert Kaufmann, DRI research associate, calls current meter reading to Robert MacDonald, field technician. This discharge from a gravel pit and a Nevada Power Co. plant on Vegas Valley Drive measured six and a half cubic feet per second.

Kaufmann at a 125-foot deep DRI well. Just behind him is a shallow well sunk by Montgomery Engineers where it is only four feet to water. Just north of East Las Vegas the ground is so waterlogged a four-wheel-drive vehicle will sit and spin its wheels.

How sick is Vegas Wash

Everyone knows Vegas Wash is sick, shockingly ill from a diet of dregs. For years it has been the cesspool for the cities and county, the gravel pits and industry. Whatever is liquid goes into the wash. The wash goes into Lake Mead, polluting one of the finest lakes in the country.

Sewage effluent has been universally identified as the villian of this environmental degredation. The plant food, cultural enrichment, nitrogen and phosphorus—call it what you will—of the effluent has been the big villian in this crime, nourishing algae to bloom, making the water murky, causing beaches to be closed to swimmers and making a terrible stench during hot weather.

There is no question but that sewage effluent is guilty. But the stream in Vegas

By
Bill Vincent

Wash is not entirely composed of outfall from the city and county sanitation plants. There are other sources of bad water and they are guilty, too. No one has even attempted to identify and measure all the sources of Vegas Wash contamination, until recently. We have looked for obvious villians, the easy solution.

Finally, however, someone is working on the whole problem, the complicated hydrology of a populated valley. Vegas Wash runs a potpourri of waters from many sources containing different elements all of which, to a varying degree, constitute water degradation.

It is a study of water quality deterioration in an arid basin being conducted by the Center for Water Resources of the Desert Research Institute. Heading the work is Dr. Robert Kaufman, research associate, a hydrologist and specialist in ground water contamination and solid waste disposal.

Because our arid basin is untimately related to an interstate body of water, the Colorado River, the Environmental Protection Agency gave its approval to a proposal written by another DRI research associate, Dr. Alan Peckham. It was funded in 1969 and Dr. Kaufman came here from Wisconsin in May 1970 to work on the project.

To find out how a water doctor approaches the problems of such a sick patient, we spent parts of two days in the field with him and his group. Working with him are Dr. Nate Cooper, another research associate, and Robert MacDonald, a field technician.

At the DRI office, Bob Kaufmann explained what they were doing before we went into the field to see how they were doing it. "It is our job," he said," to identify all the points where waste streams enter the wash. Then, on a continuing basis, we measure the amount of flow and determine the water chemistry. We also find the sources for the waste streams, sewage systems, gravel pits, power and industrial plants and ground water return."

Samples for chemical analysis are taken to Dr. Jack Sanders of the Bureau of Water Quality who has set up a laboratory in one of the Bureau of Mines' buildings in Boulder City. His reports provide Bob with a running talley of the total dissolved solids, the amount of iron, nitrates, phosphorus, sodium, lead, calcium, the major and trace metals, the acidity or alkalinity.

This information on quality is combined with the data on quantity and the measurements of water table elevations through time. Then the mind boggling tables of figures are run into computors. The feedback of this data, after it is electronically sorted, correlated, added and projected, "gives us," Bob said, "what we need to be able to predict what's to come."

With that we headed out Boulder Highway to check some of the wells being monitored and several of surface water sampling points. Bob said "The underground water head is up around East Las Vegas and Pitman, the lower parts of the valley. Near the new sports stadium the DRI has two wells. Water is flowing from one, and is only three feet from the surface in the other. At the stadium, the table is about eight feet. And Duck Creek, a major drainage, is right by it."

"The LDS farm has areas so waterlogged that they are bare. We know of swimming pools being floated right out of the ground. We ask ourselves the question, when Lake Mead water is delivered in quantity will people use more water on lawns to flush the salts away?"

A good question for according to the Montgomery Engineers report, we already use 475 gallons of water a day for every man, woman and child in the valley, more than double the 200 gallons a day per capita consumed in Tuscon, Ariz. DRI has found the

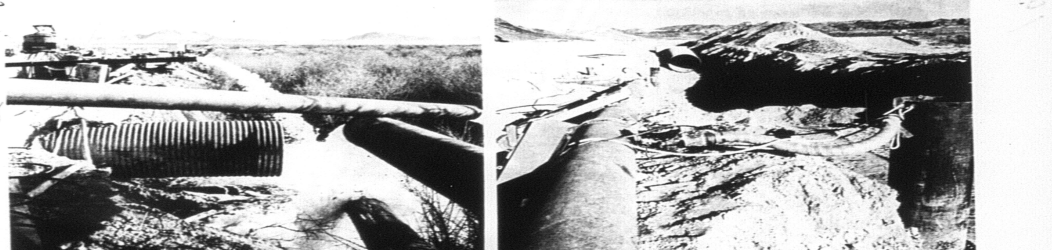
How infrared photos work

Infrared photography was developed during the war. It is sensitive to chlorophyl which shows up red on the films. Artificial green is not picked up. The camera will look right through camouflage netting or any other artificial green.

In our cover picture, Vegas Wash in Lake Mead is the white area at the top of the page. The black line cutting diagonally across the page is Boulder Highway and the red patterns at center-right are the vegetation in Henderson. Paradise Valley golf course is just below.

The parallel black lines at bottom-right are runways at McCarran Airfield. Bonanza and Stardust Country Clubs are the red designs at bottom - center.

The large red areas in the center are the LDS, police and other farms, their red showing vegetation linked to the that of the wash snaking up to Lake Mead. Taken at 35,000 feet, the photo brings out in excellent detail the contours and faults on the west end of Frenchman Mountain.



To dry out the ground through Vegas Wash so shovels can dig a ditch to bury the water pipe for the Lake Mead diversion project, shallow wells are pumping 27 million gallons of water an hour.

minerals, the total dissolved solids, of Lake Mead water to range from 675 to 735, parts per million, an average of 700. Underground water provided by the Vegas Valley Water District varies from 245 to 741 ppm, depending on the well, with an average of only 367.

While the water table in the lower valley is rising, the ground level is dropping in some parts of the upper valley. Around the old Kyle Ranch the ground level has subsided as much as three feet. The cone of depression—that cone-shaped area around a well affected by pumping,—encompasses a residential section. The situation is like a teeter-totter, and the homeowners on both ends are in for trouble.

After a look at the drainage from the Nevada Power Plant at Whitney, we headed into the wash, running the tops of the dykes of the BMI settling ponds intended to evaporate the liquid industrial waste. Bob pointed out a number of dead coots, probably the victims of that strange breed of man and boy who spend hours in the sewage shooting at anything that moves. In one of Henderson's effluent ponds eight shore birds—I am not a birdman but they looked like long-billed curlews to me—were nibbling their way along the shallows.

We pulled up at two wells and got out. Bob explained, "One is a shallow well, drilled by Montgomery Engineers. We put in the other, 125 feet deep. We drilled 37 wells from August to December last year, most of them located next to an existing one. We saved money that way."

"The shallow wells show the effect of water logging and salting. Deep wells give us the physical effects of subsidence, the changing elevation of deep water tables. With the two we can measure the head and quality of the water at different levels and determine how the water moves laterally and vertically."

The Boyle Engineering report did not go into these questions of changing water patterns. Boyle was only asked to suggest ways of handling our sewage effluent so it would not contaminate Lake Mead or violate Federal water quality standards. This report recommended the stuff be piped to the Colorado River below Hoover Dam and dumped into one of the finest trout fishing streams in the country.

As the day progressed Bob was to show me how a solution of the problem would fail to provide a full answer to the big question of water quality deterioration in an arid basin.

In addition to the wells, the DRI is sampling surface water at nine points in the valley. The source of such runoffs are springs, industrial and sewage plants and gravel pits. DRI has a few permanent installations, weirs with v-shaped throats and a gauge. "Most of our measurements are done with a current meter," Bob said. "Kids keep tearing out the permanent structures. The velocity of the water multiplied by the size of the canal gives us the cubic feet per second, the gallons per minute."

There are roughly 30 million gallons of surface water flowing down the wash. At Pabco Road, this big stream is carrying a huge load of minerals, 3,191 parts per million. At the point where city and county sewage effluent enters the wash, upstream perhaps two miles, the total dissolved solids are about a third, 1,188 ppm. Keep in mind that the U. S. Department of Health has set 500 as the acceptable maximum.

Just east of Pabco Road, the 10-foot diameter pipe of the Southern Nevada Water Diversion Project is being installed underground. The big ditch is being dug by sections. Each section is sucked dry by a series of wells 50 feet deep. The shallow water table has to be lowered or the shovels and other heavy equipment would sink out of sight. That string of we'lls is pumping 27 million gallons a day, Bob told me, and pouring them into the channel of the wash. That gives one some idea of just how waterlogged that end of the valley is.

The study by Bob Kaufmann and his colleagues was financed by the Environmental Protection Agency, $150,000 for the first year and $190,000 for the second. Money also has come from the Fleischmann Foundation, Colorado River Commission, the Water Quality Office and the Bureau of Outdoor Recreation.

When the results are in we will have a pretty good idea of what we are doing to Vegas Valley and in turn what Vegas Valley will do to us. However, Bob would like to take a deeper look into our underground water resources.

"We want to set up an isotope study, find out how long it takes water entering the system from the Spring Mountains and Sheep Mountains to reach our well fields and the springs at Corp Creek, Blue Diamond and Tule Springs.

"We would like to know just how old the water is at the seeps on Whitney Mesa, in Vegas Wash, and in the deep municipal wells. We need to know how water is responding to what we are doing to it," he said.

Isotopes are different forms, radioactive transformations, of the same element. Tritium, which comes mostly from nuclear testing, would be used for testing for young water. The natural, more stable forms of radioisotopes, deuterium and oxygen 18, provide good approximate ages for older water. Bob ruled out carbon 14 dating as probably too expensive.

Meanwhile, there are other aspects to the water problem, such as conservation to prevent a shortage, to reduce water logging in low areas and to insure against home foundation damage and block wall collapses. We bring this story to you next week.

Historical footnote

Elbert Edwards of Boulder City said that in early days there was no water running down Vegas Wash.

Vegas Creek fed by artesian springs and seeps provided water for a meadow, but the surface flow disappeared long before it reached the lower part of the valley. East Las Vegas and the Pitman area were dry.

Elbert Edwards also remembers a rather good-sized spring in the narrows, near where the road to the North Shore crosses. "I came across it while helping Frank Allen drive horses. It was rather strong. The stream didn't flow very far before disappearing. Vegas Wash was dry except when we had a heavy storm."

Being an historian, Edwards looked up the report by Lt. J.C. Ives, dated March 12, 1858. Ives wrote that after he established Camp 57 at the foot of Black Canyon he worked his way up river until he reached Fortification Hill. There he came to the mouth of a stream he described as a wide and deep river with clear water but a strong brackish taste.

This must have been Vegas Wash. Somewhere deeper in the canyon, below where Edwards and Allen ran across the ground water from the Vegas basin burst forth.