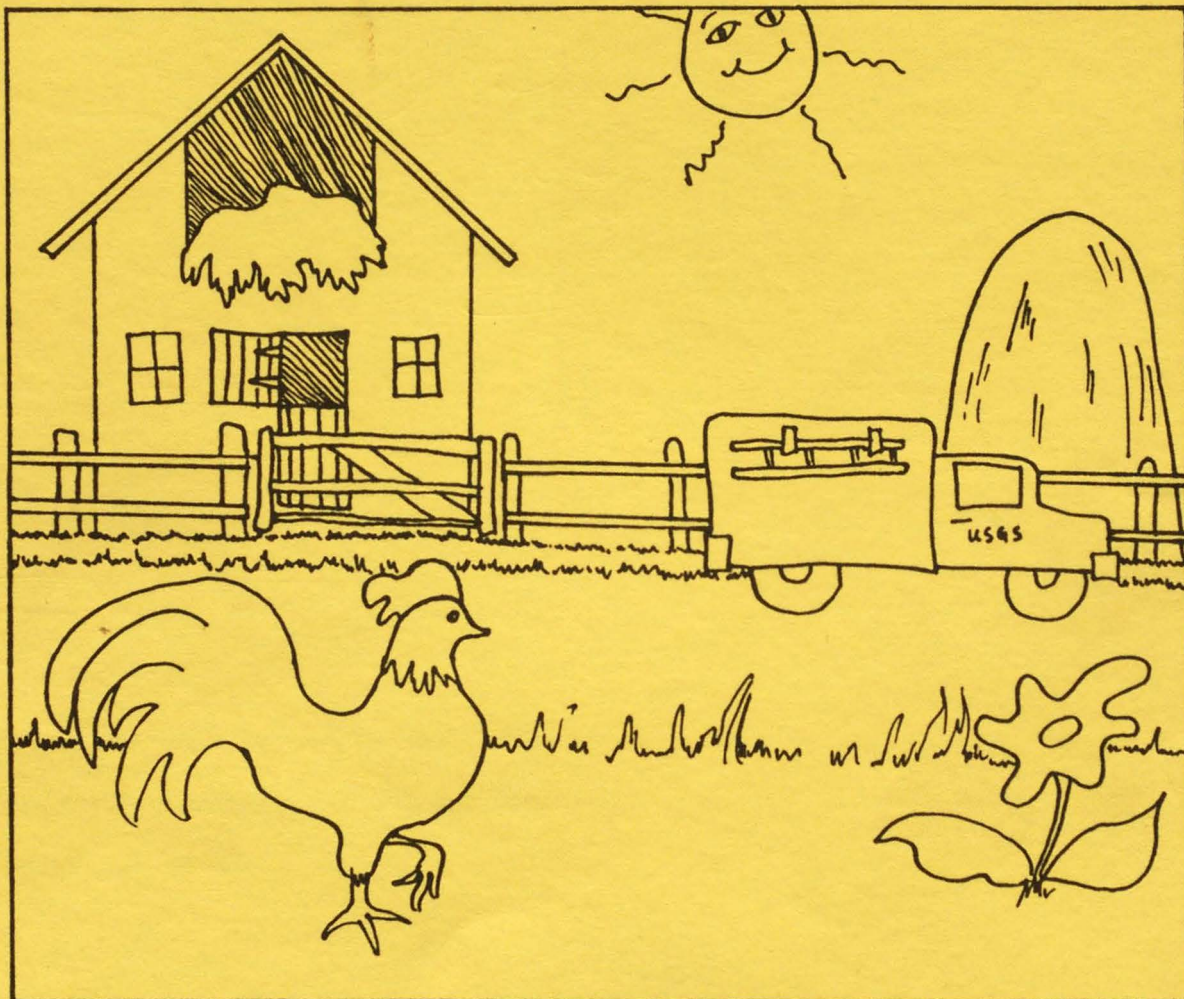
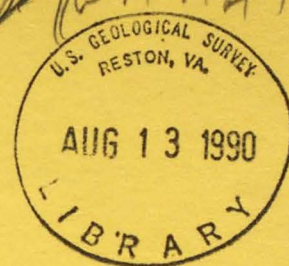


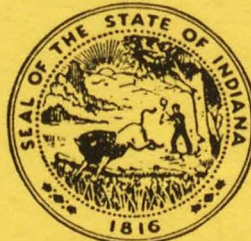
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WILLIE TAKES A FIELD TRIP

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U.S. GEOLOGICAL SURVEY
Open-File Report 90-125



Prepared in cooperation with the
INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Water

WILLIE TAKES A FIELD TRIP



By Donald V. Arvin

U.S. GEOLOGICAL SURVEY

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Indianapolis, Indiana

1990

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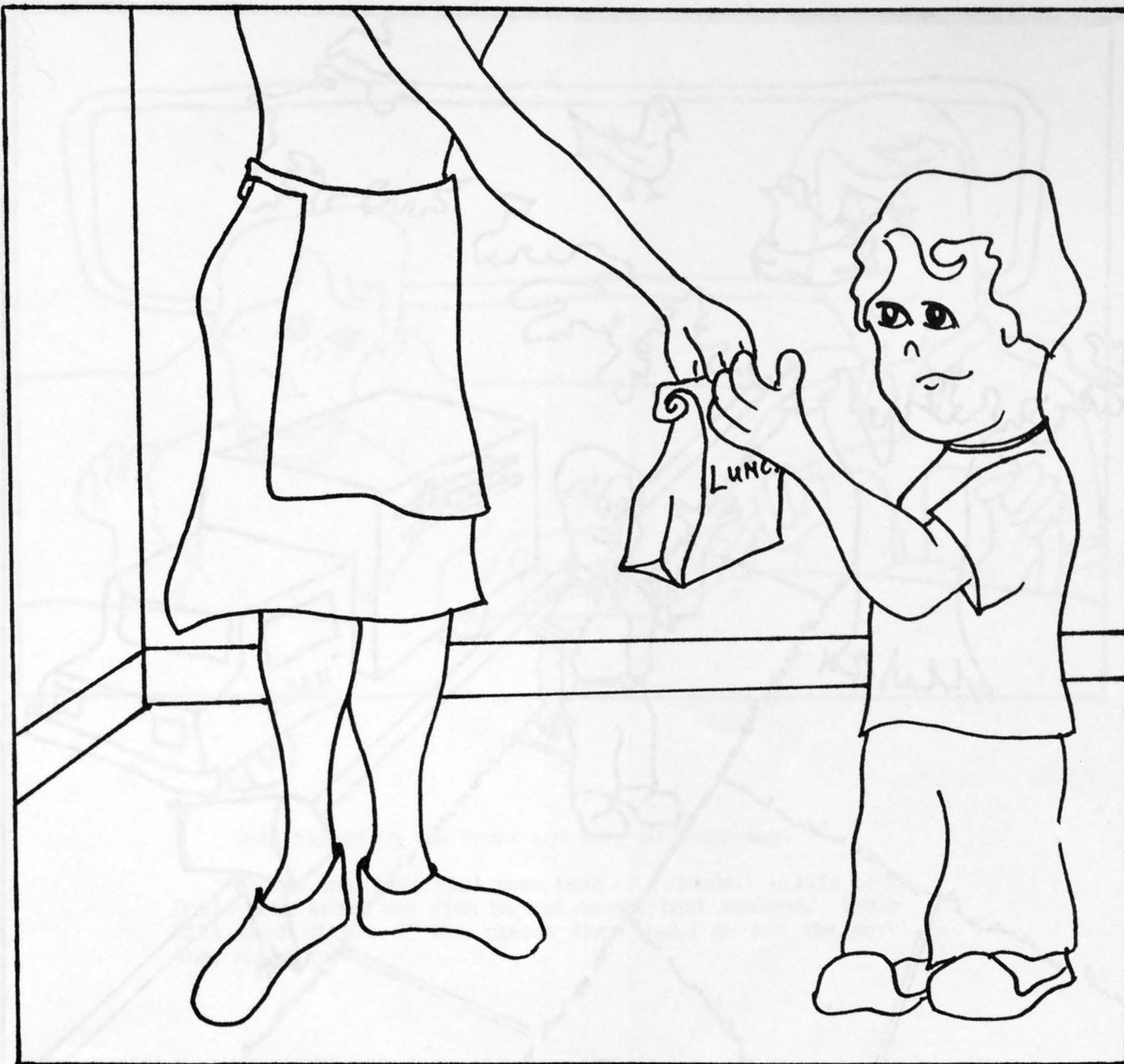
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The alarm clock rang and Willie woke up. The day had finally arrived! Willie was going to the field with Uncle Bill.



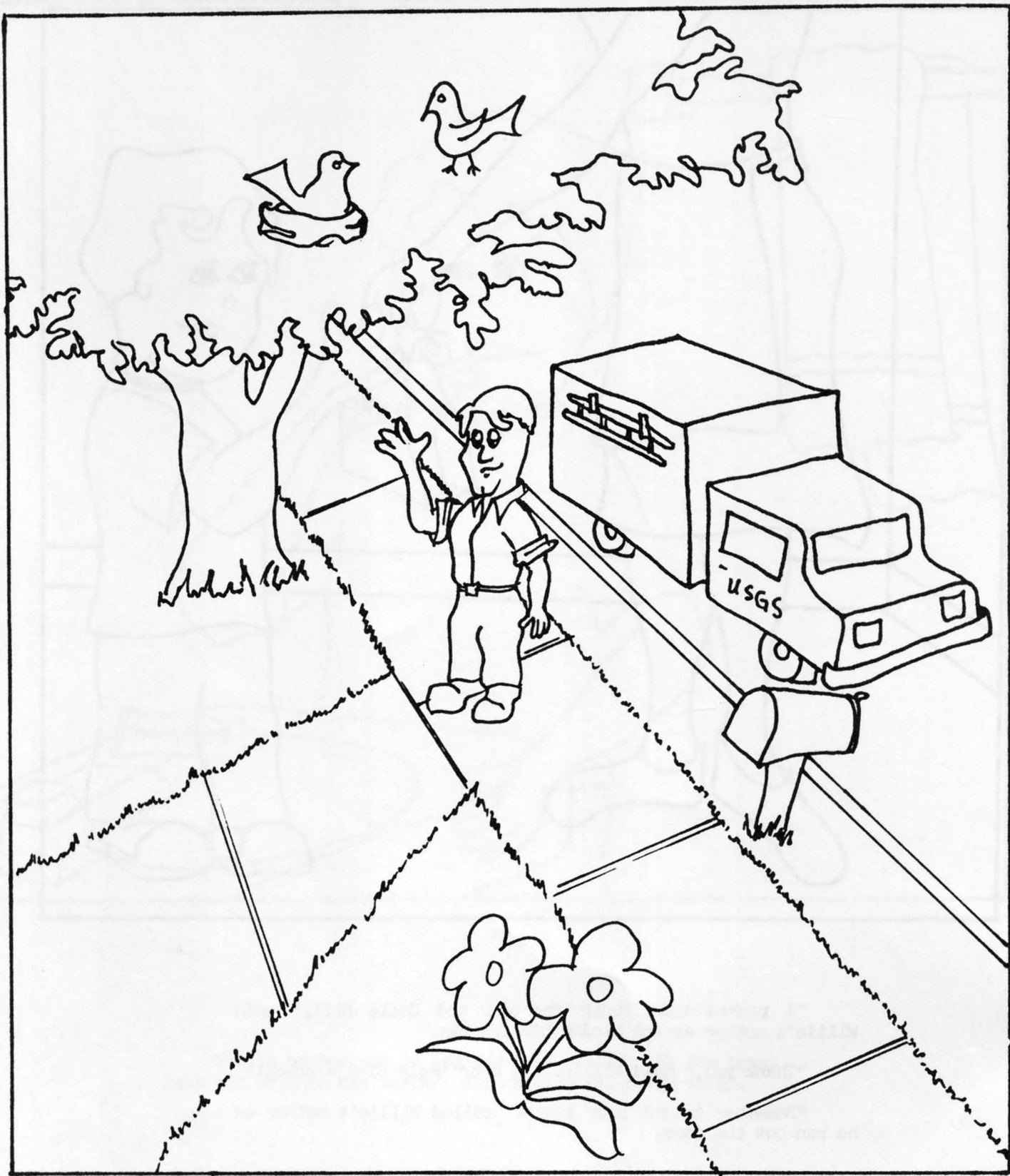
Willie hopped out of bed and got dressed. He ate breakfast and brushed his teeth. Soon Willie was ready to go.



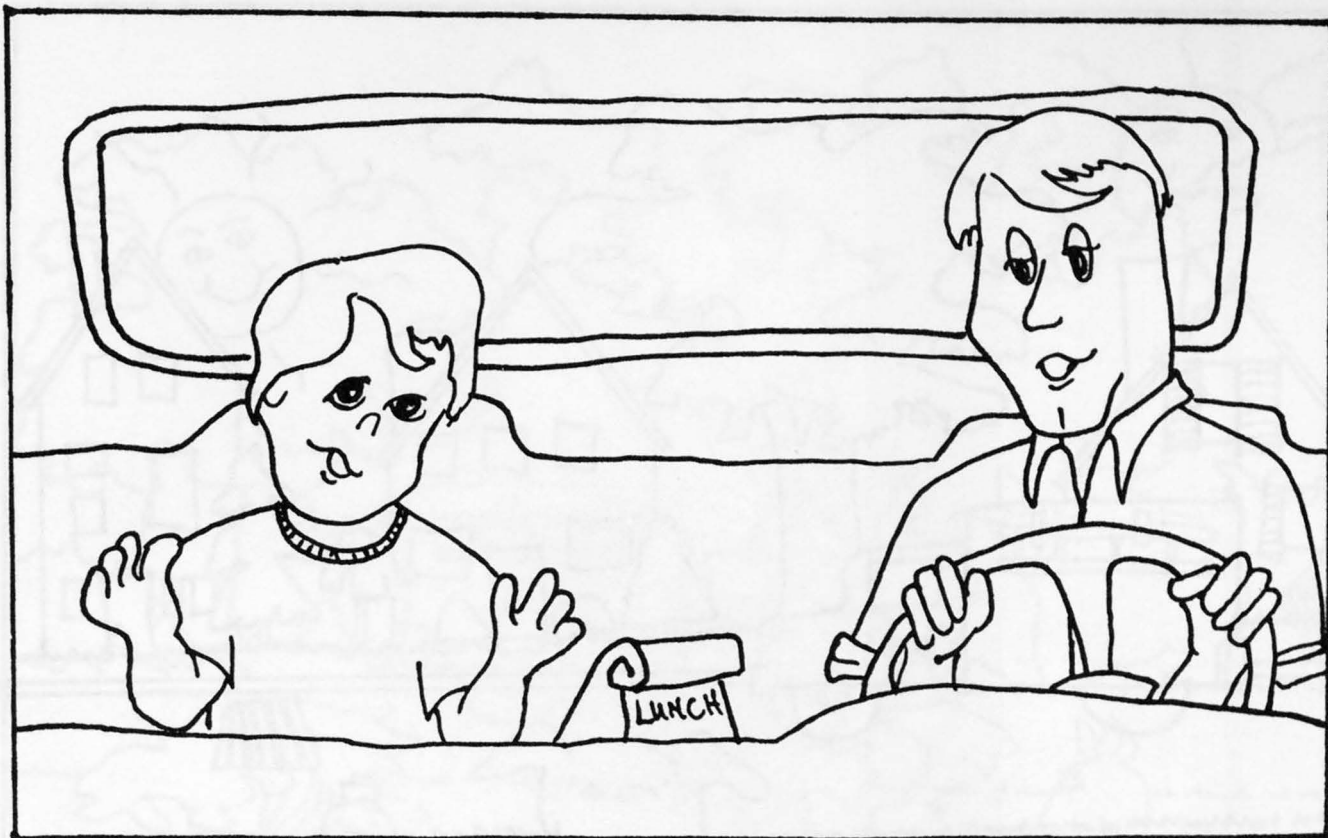
"I packed this lunch for you and Uncle Bill," said Willie's mother as she handed him the bag.

"Thank you," said Willie. "I hear Uncle Bill's truck!"

"Remember to eat your lunch!" called Willie's mother as he ran out the door.

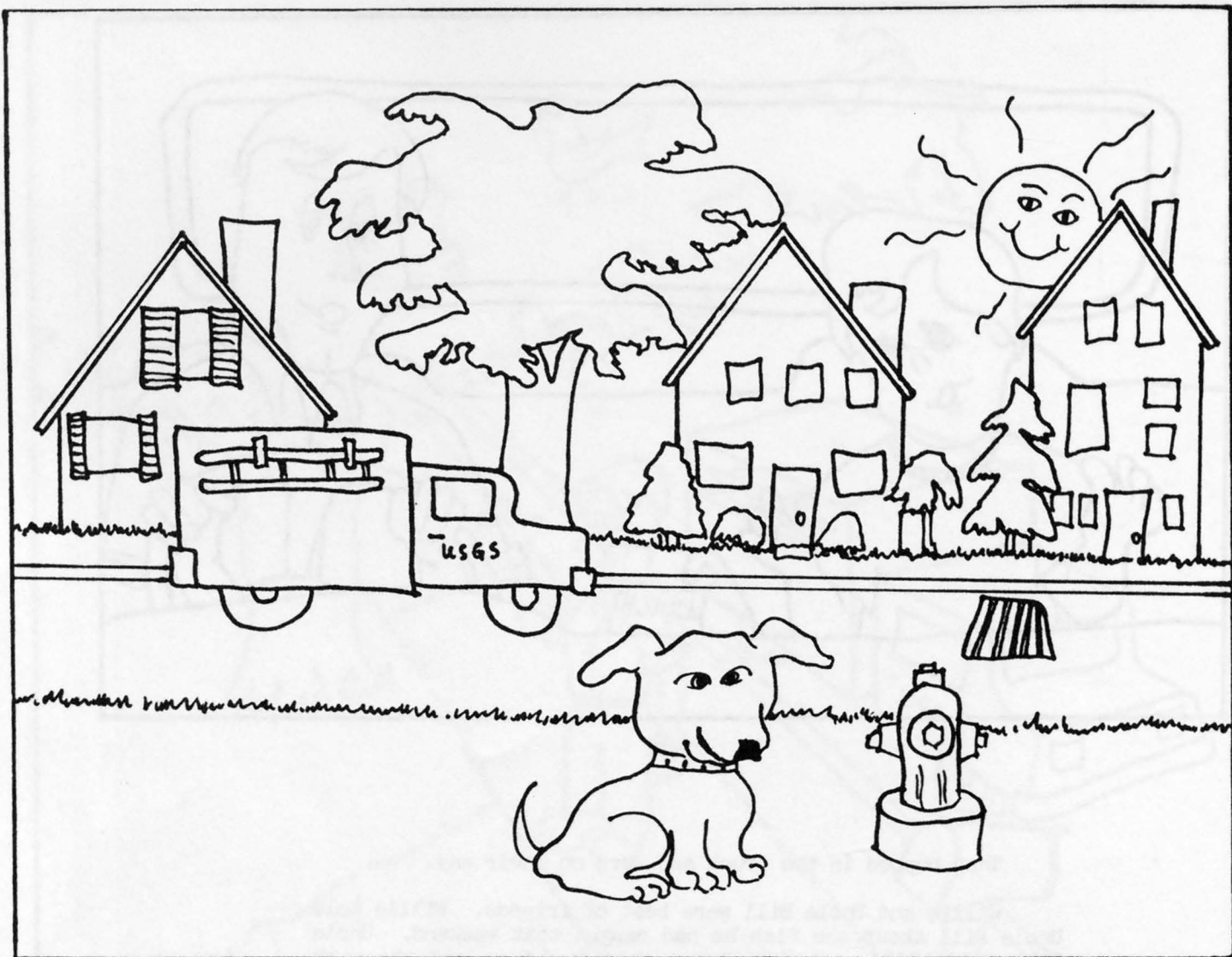


Uncle Bill was a hydrographer for the United States Geological Survey. He had asked Willie to help him with some field work. "Hello, Willie!" he called.

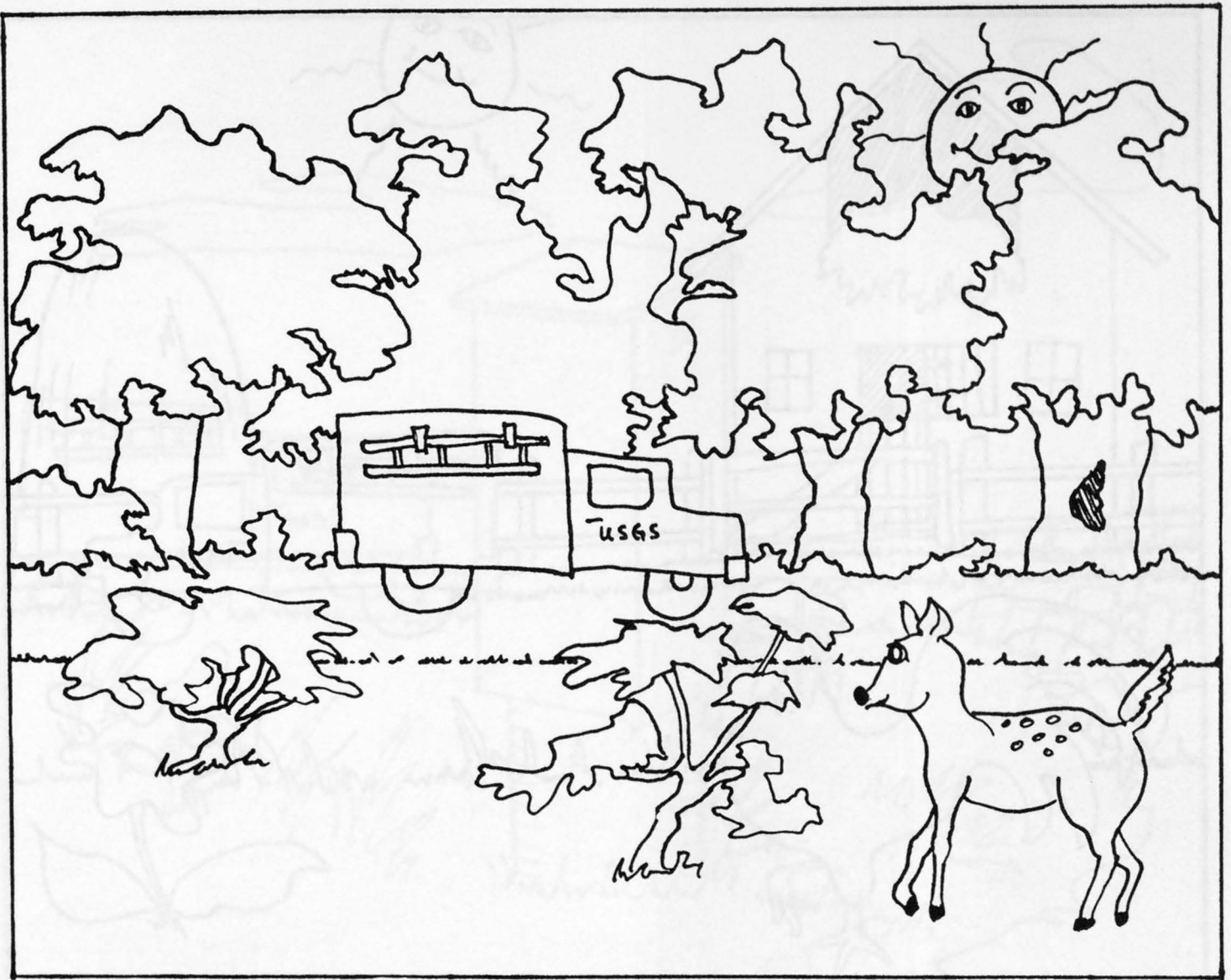


They hopped in the truck and were on their way.

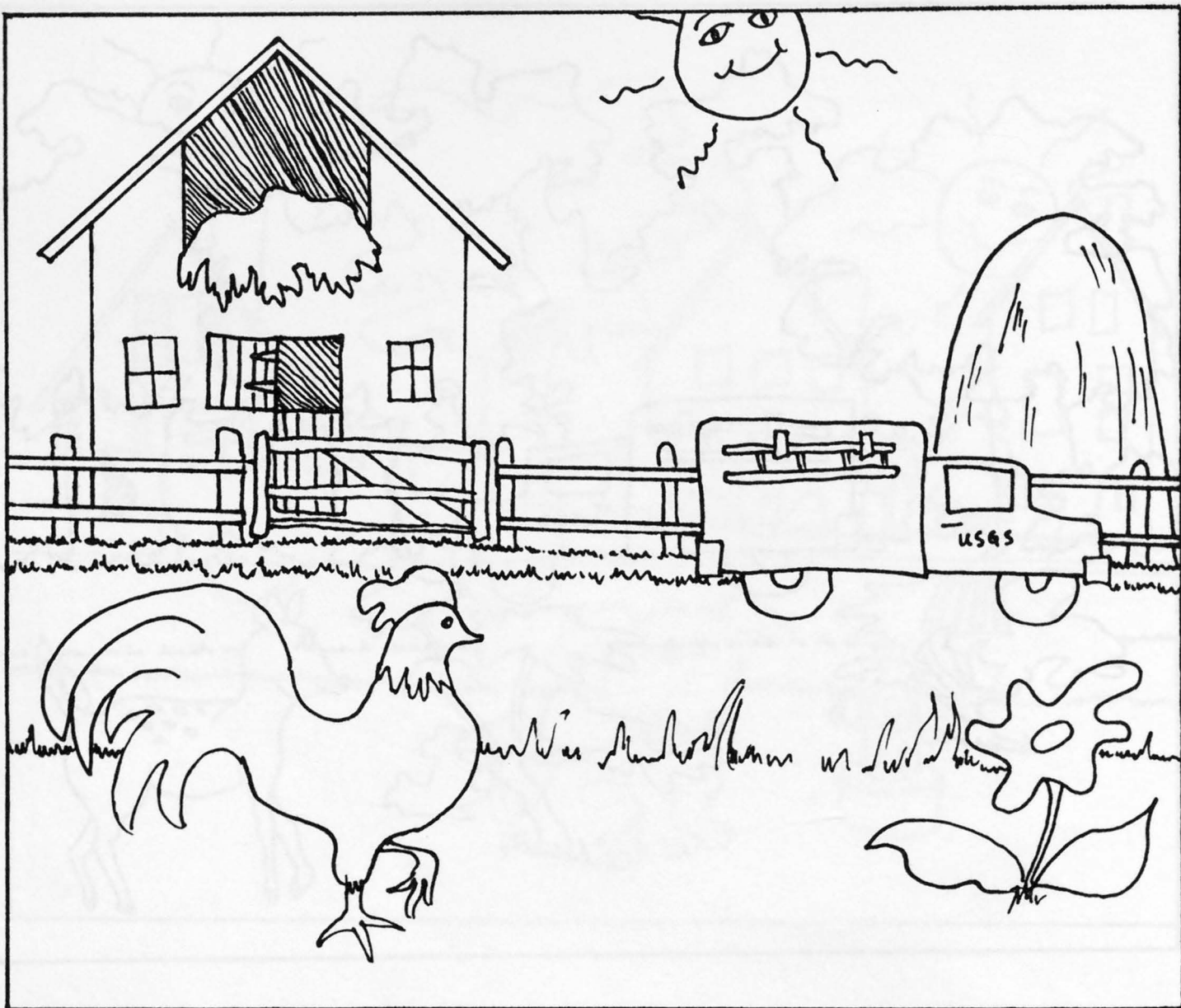
Willie and Uncle Bill were best of friends. Willie told Uncle Bill about the fish he had caught that weekend. Uncle Bill told Willie of the places they would go and the work they would do.



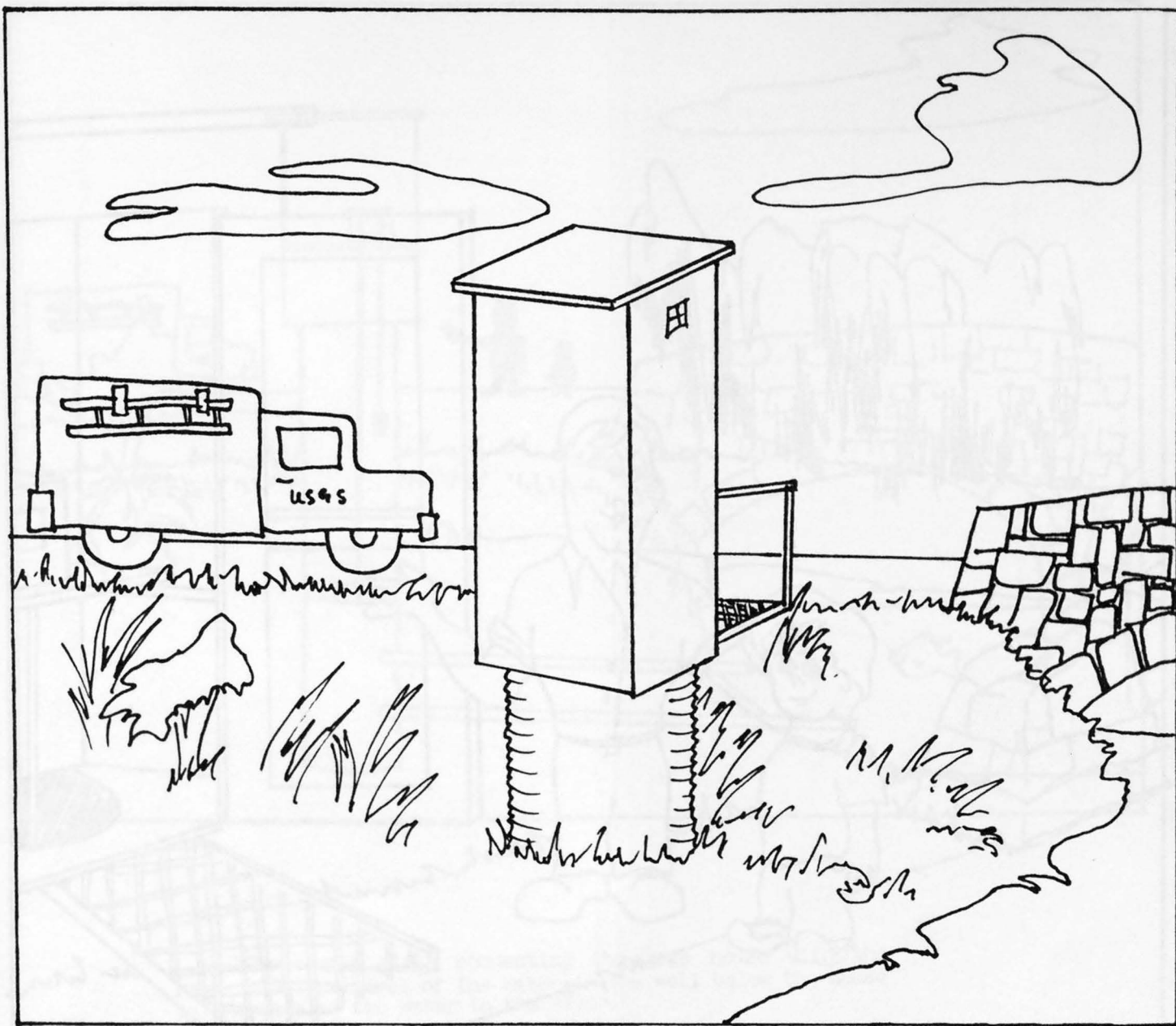
First they would collect streamflow data at East Fork River. The site was many miles away. To get there, they drove through towns ...



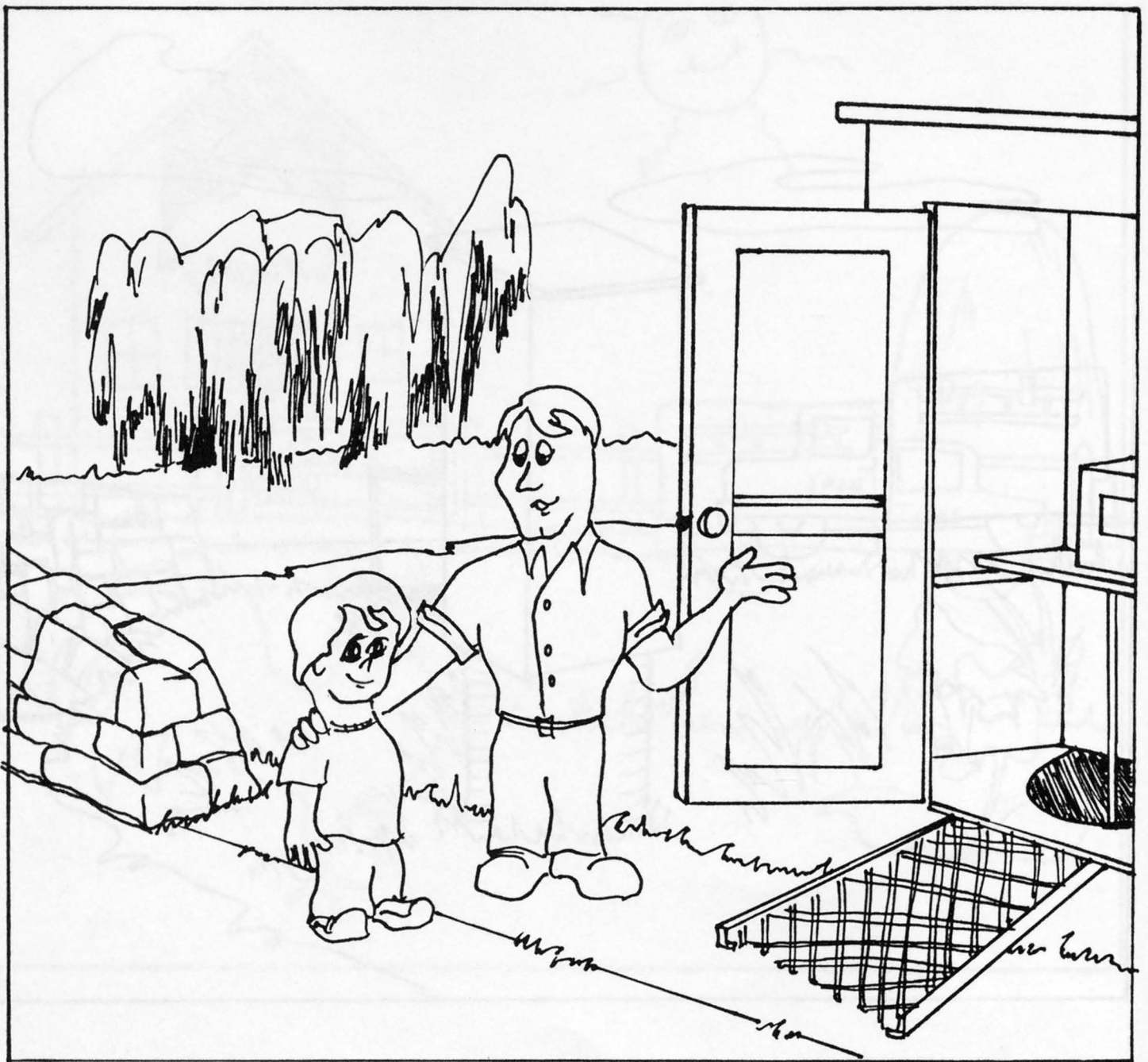
They drove through forests ...



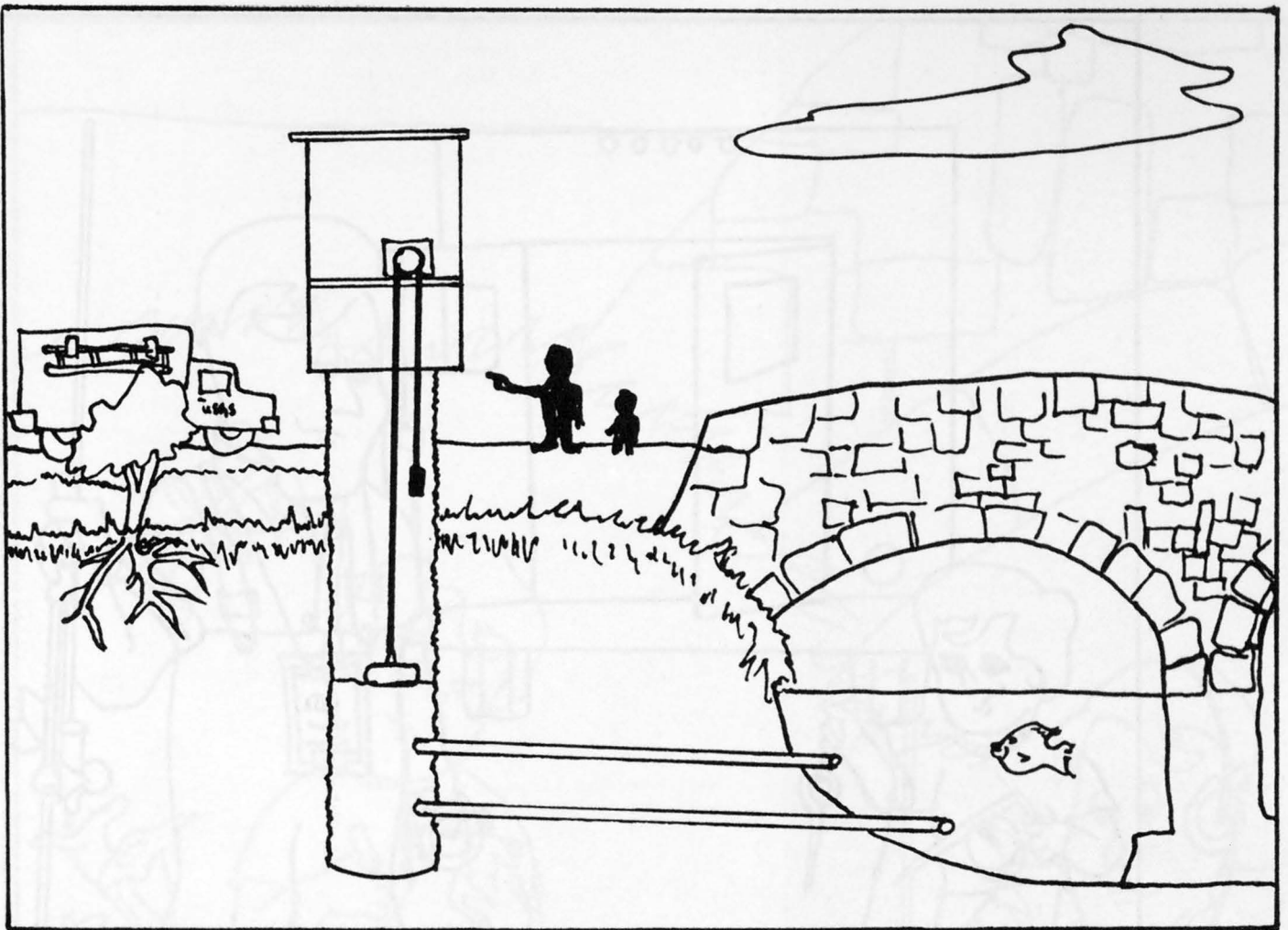
And they drove by farms.



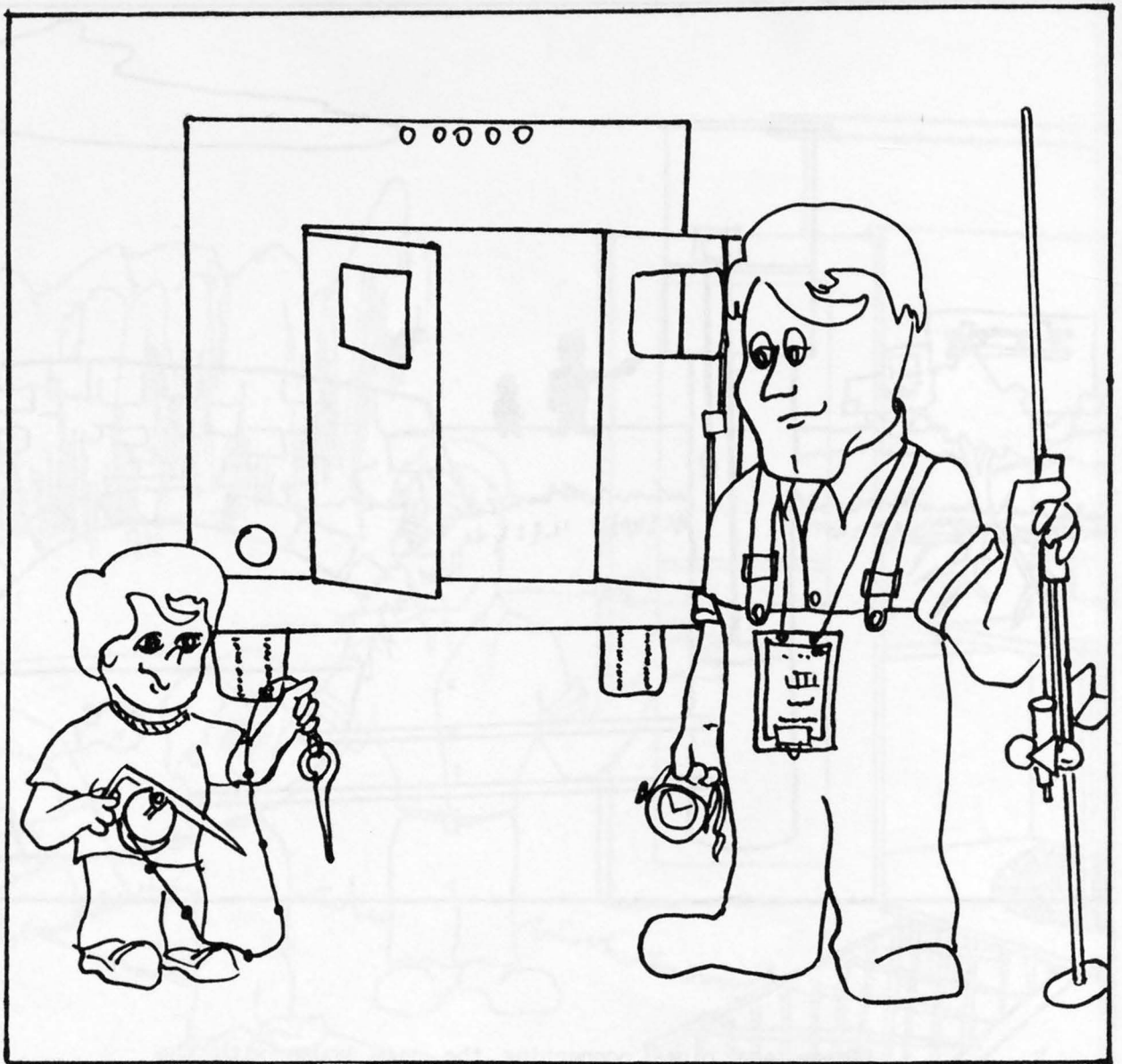
They finally reached East Fork River. "That small metal building is called a gage house," said Uncle Bill. He parked the truck. Then he and Willie got out and walked over to the gage house.



"That box on the shelf records water level data. That data will go into our computer," said Uncle Bill.



"There are pipes connecting the gage house with the river. So the level of the water in the well below the house is the same as the water in the river."



"Besides the water level, we also need to know how much water is flowing in the river," said Uncle Bill as he began pulling equipment from the truck. He took off his shoes and slipped on a pair of rubber waders.

"I'll make the measurement and you write down the notes, Willie."

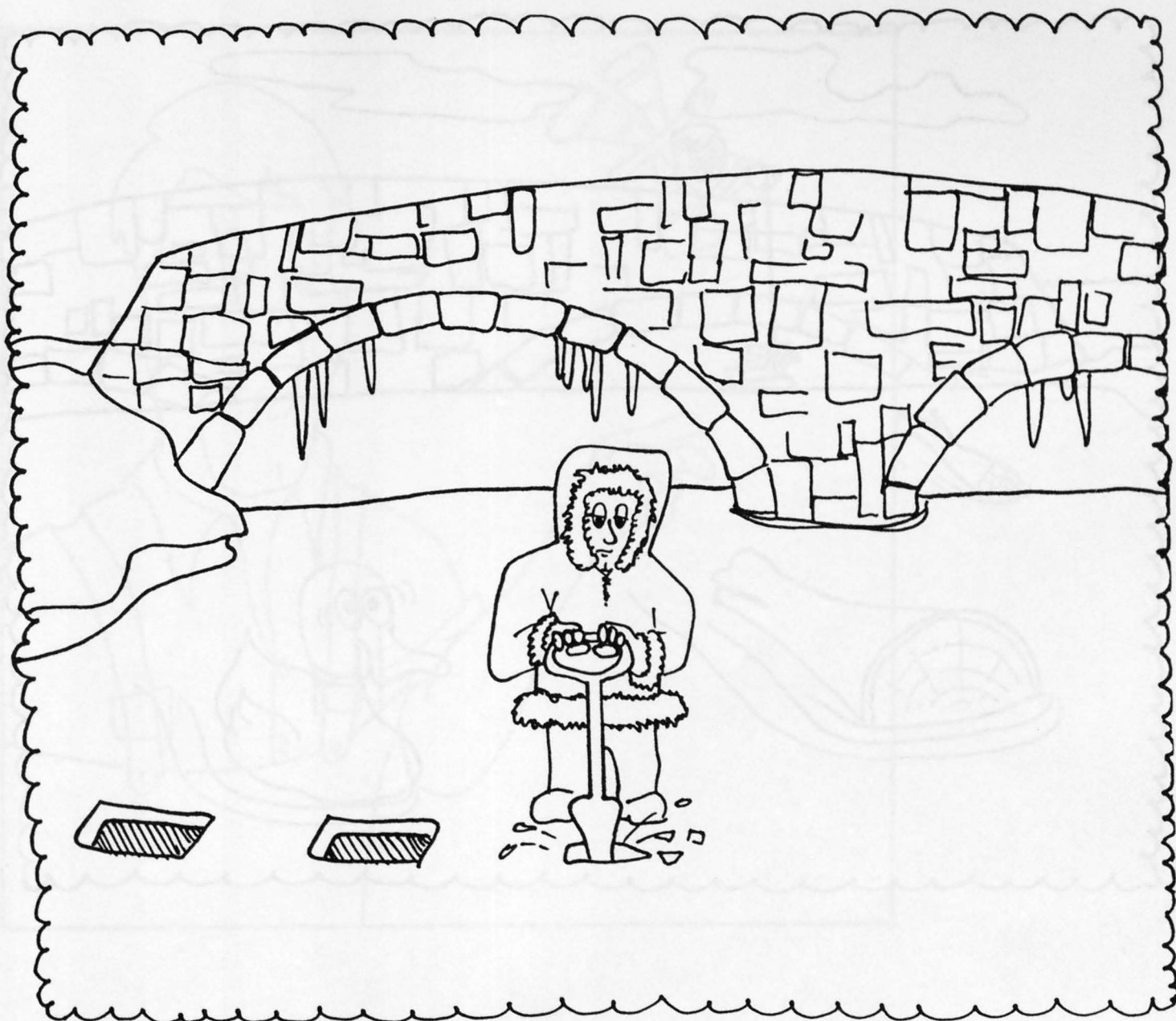


The flowing water turned the cups on the current meter. As the cups turned, Uncle Bill counted clicking sounds. He measured how fast the water flowed and told Willie what numbers to write down.

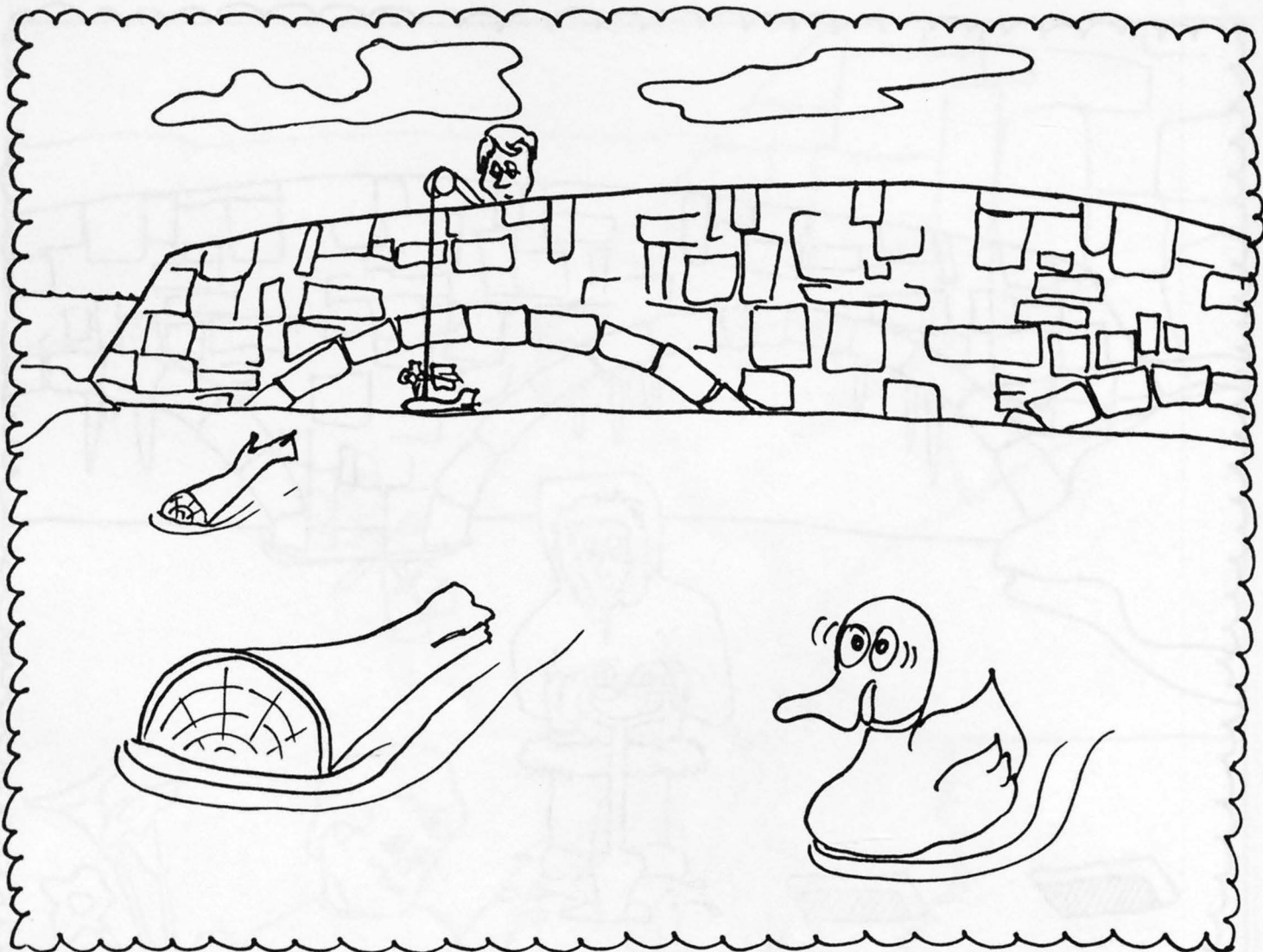


After taking readings at several places across the river, Uncle Bill hopped up on the bank and added up Willie's notes. "427 cubic feet per second," he announced.

"It must be fun to do this all the time," said Willie.

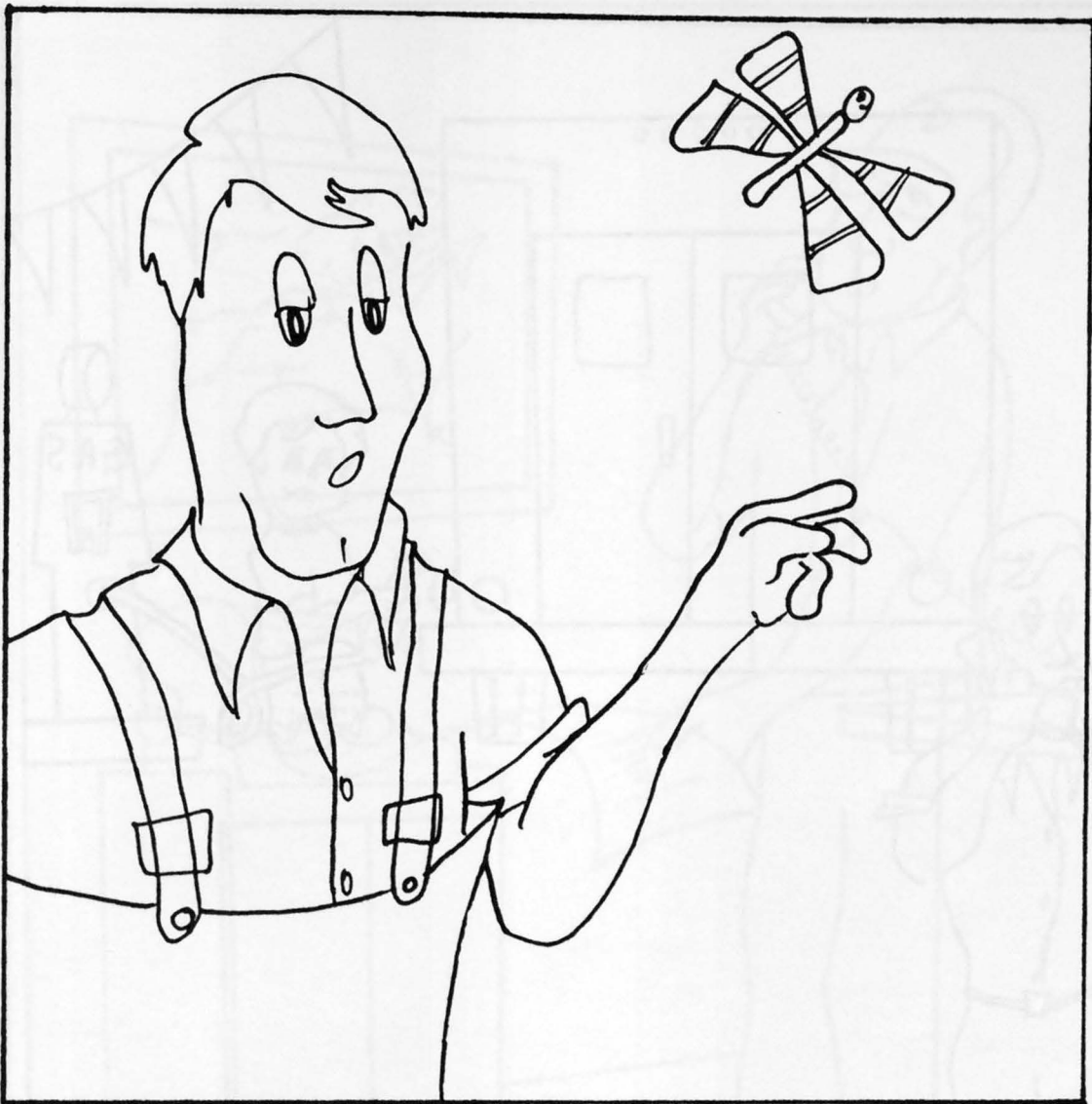


"I enjoy my job very much," replied Uncle Bill. "But I can remember days that were not quite this fun. I remember last winter when I had to chop holes in the ice to make a measurement."



"I can also remember the flood last spring. The water level was so high, I had to dangle my meter from the bridge instead of wading. Fallen trees almost smashed my meter."

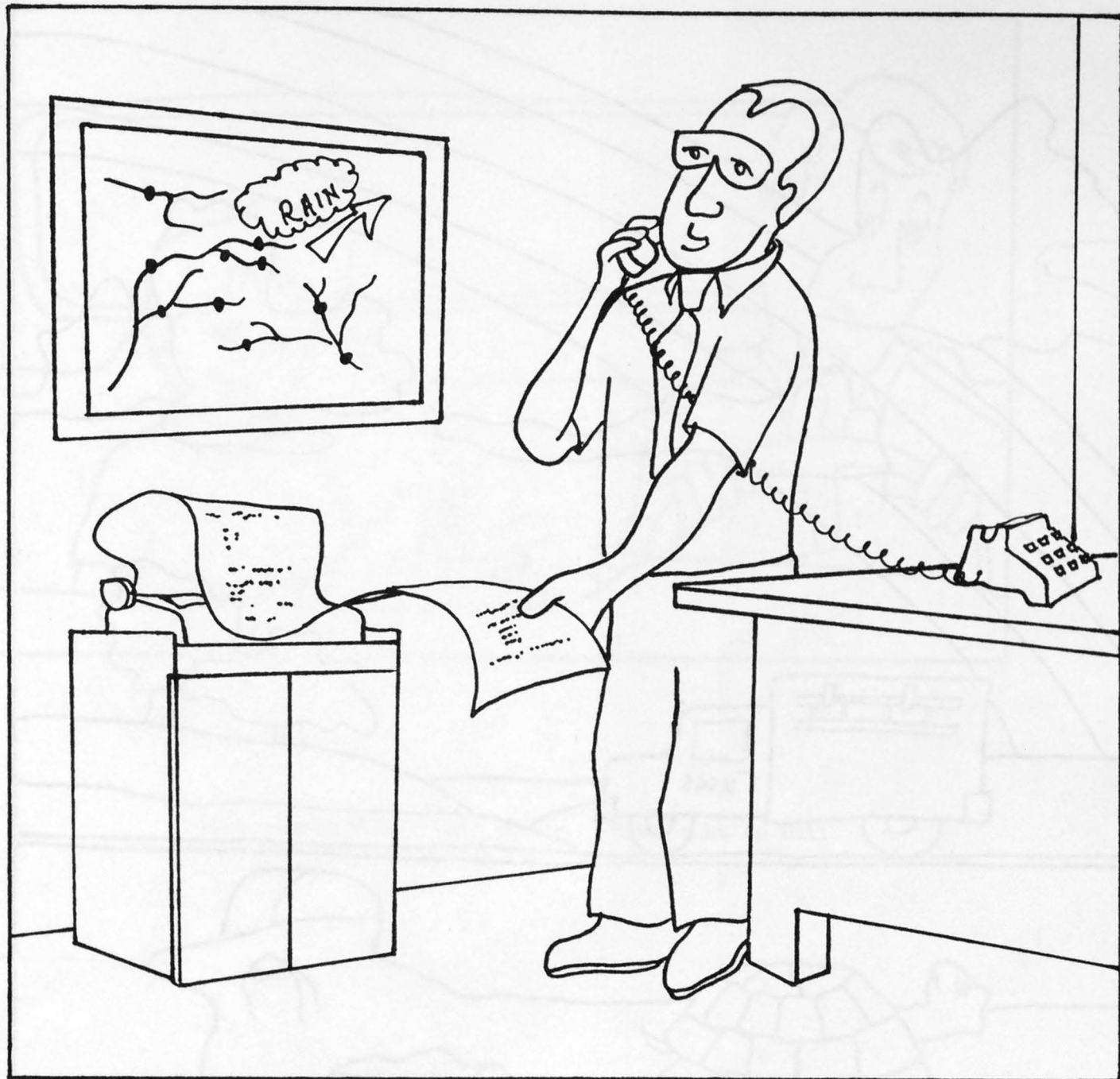
"And of course," added Uncle Bill, "there are all those rainy days ..."



"Oh, that reminds me," said Uncle Bill as he snapped his fingers. "There was a chance for heavy rains up north. We should finish things here and check in with the office."



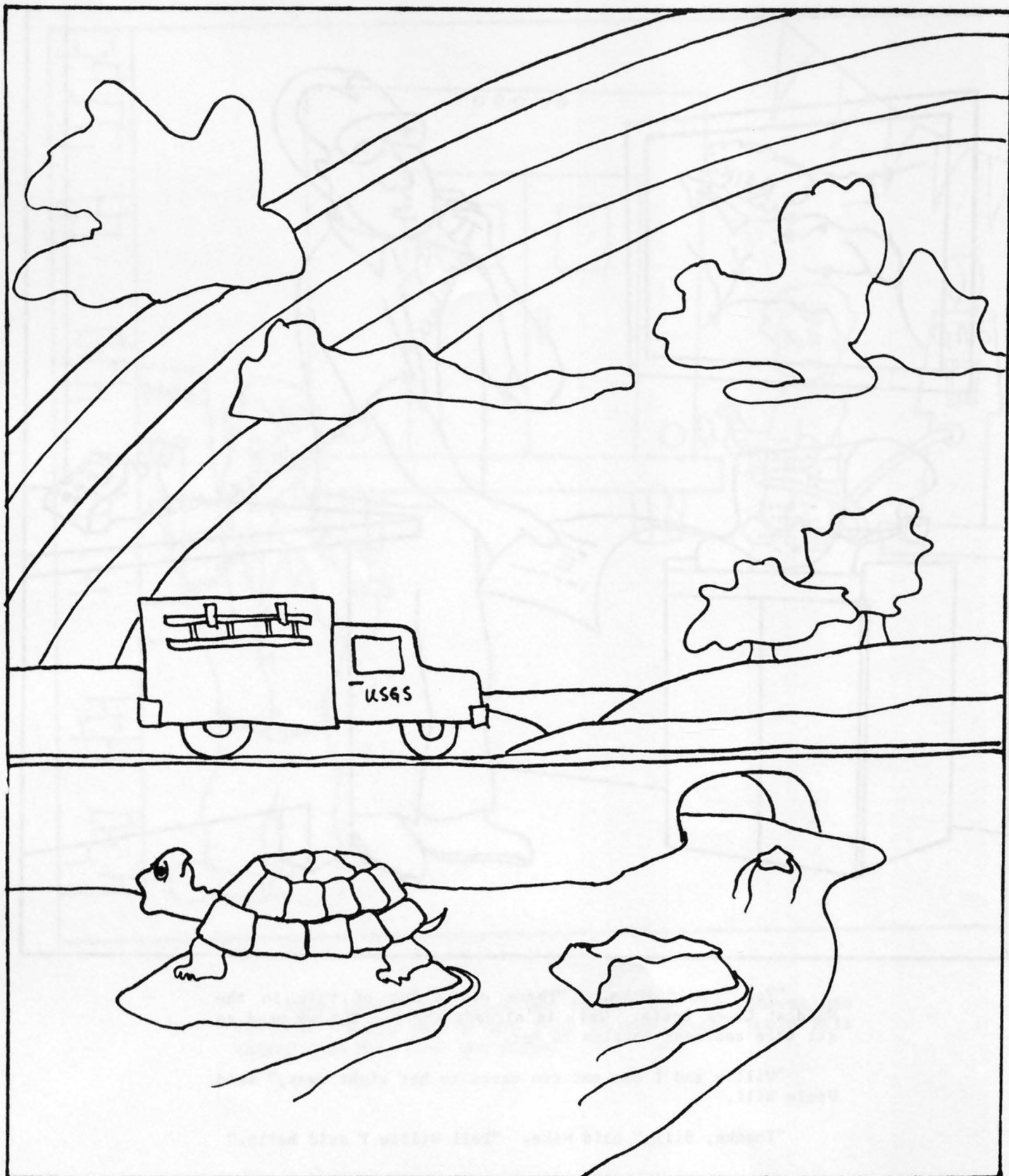
They loaded the truck and headed for the nearest gas station. While Willie put fuel in the truck, Uncle Bill talked with Mike over the phone.



"Yes," said Mike. "There was a lot of rain in the Wildcat Creek basin. Gail is already there. But we need to get more sediment bottles to her."

"Willie and I can get two cases to her right away," said Uncle Bill.

"Thanks, Bill," said Mike. "Tell Willie I said hello."



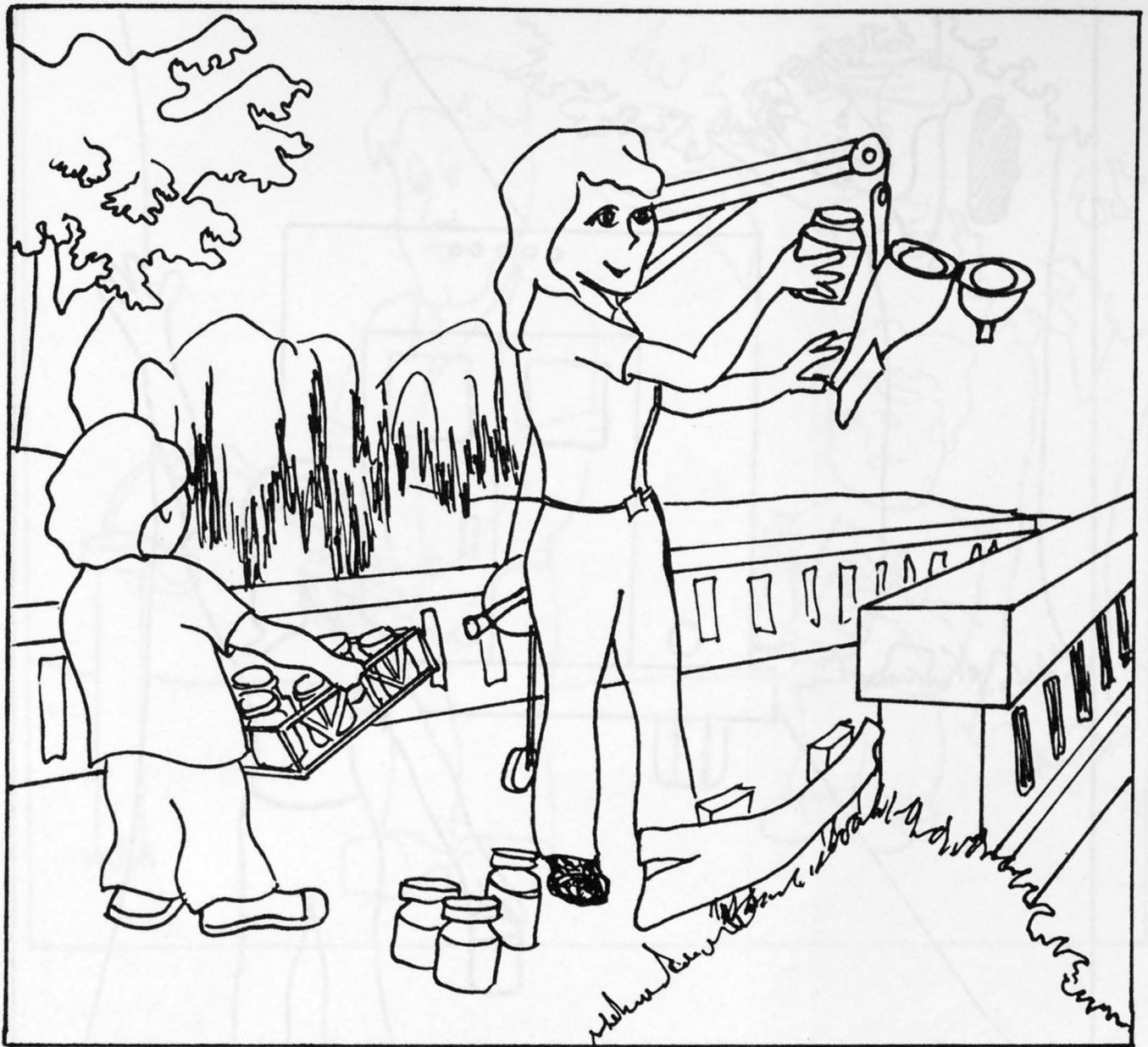
They were soon on their way. As they got closer to Wildcat Creek, Willie could see that the rain had stopped and the sky was clearing.



"Look, Uncle Bill," said Willie. "That must be Gail working on that bridge up ahead."

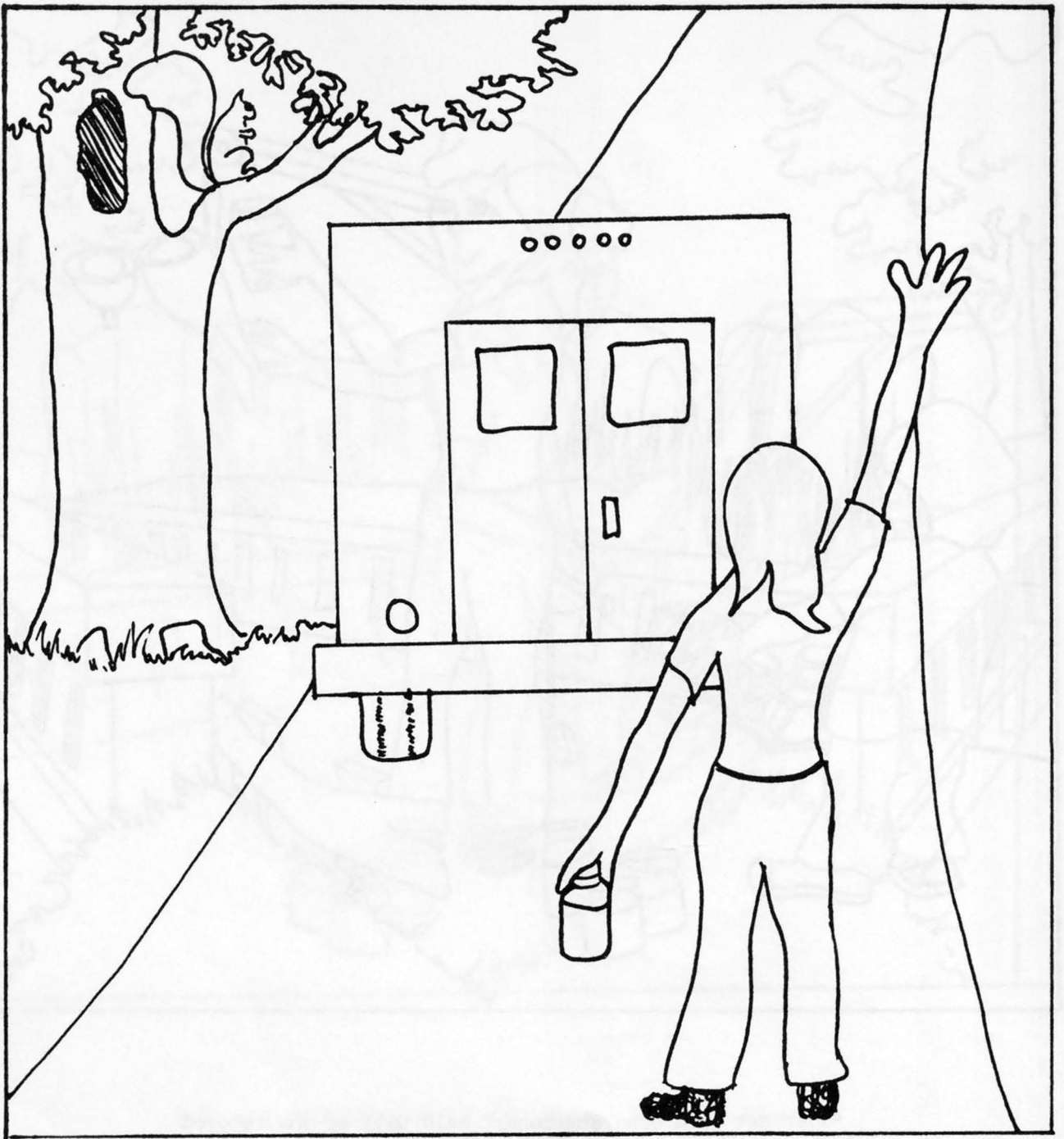


Gail was collecting water in her last bottle. "Perfect timing!" she called as they drove up.



"Just set them down anywhere," said Gail as she removed a bottle from the sampler. "Thank you very much."

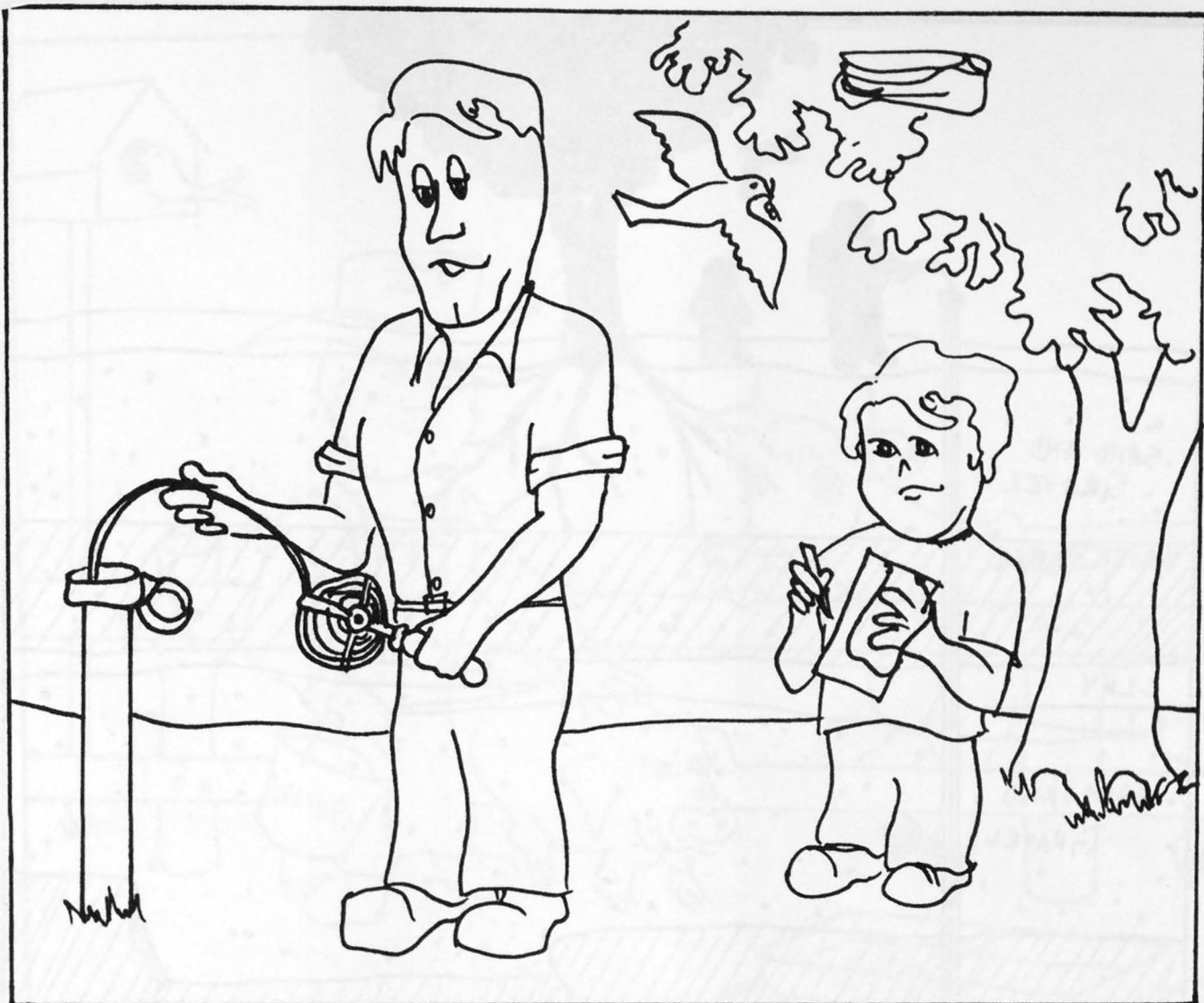
"You're welcome," said Willie. He unloaded both cases of bottles.



They were on their way once again.

"Next we go to a ground water well," said Uncle Bill.

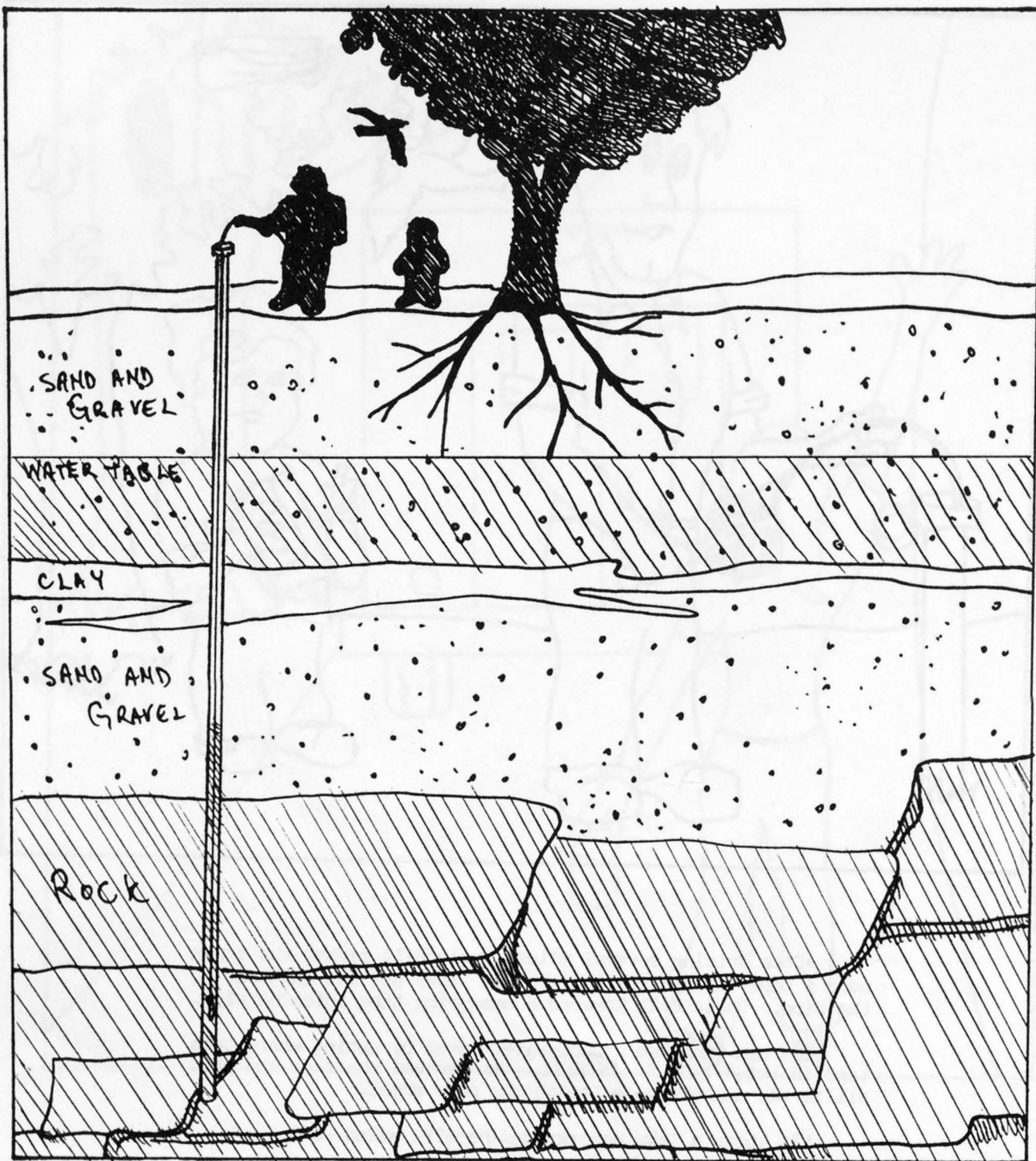
The day was passing quickly and they had more work to do.



After driving several miles, Uncle Bill parked the truck near a pipe rising from the ground. They got out and went to the pipe. Uncle Bill lowered a measuring tape into the pipe.

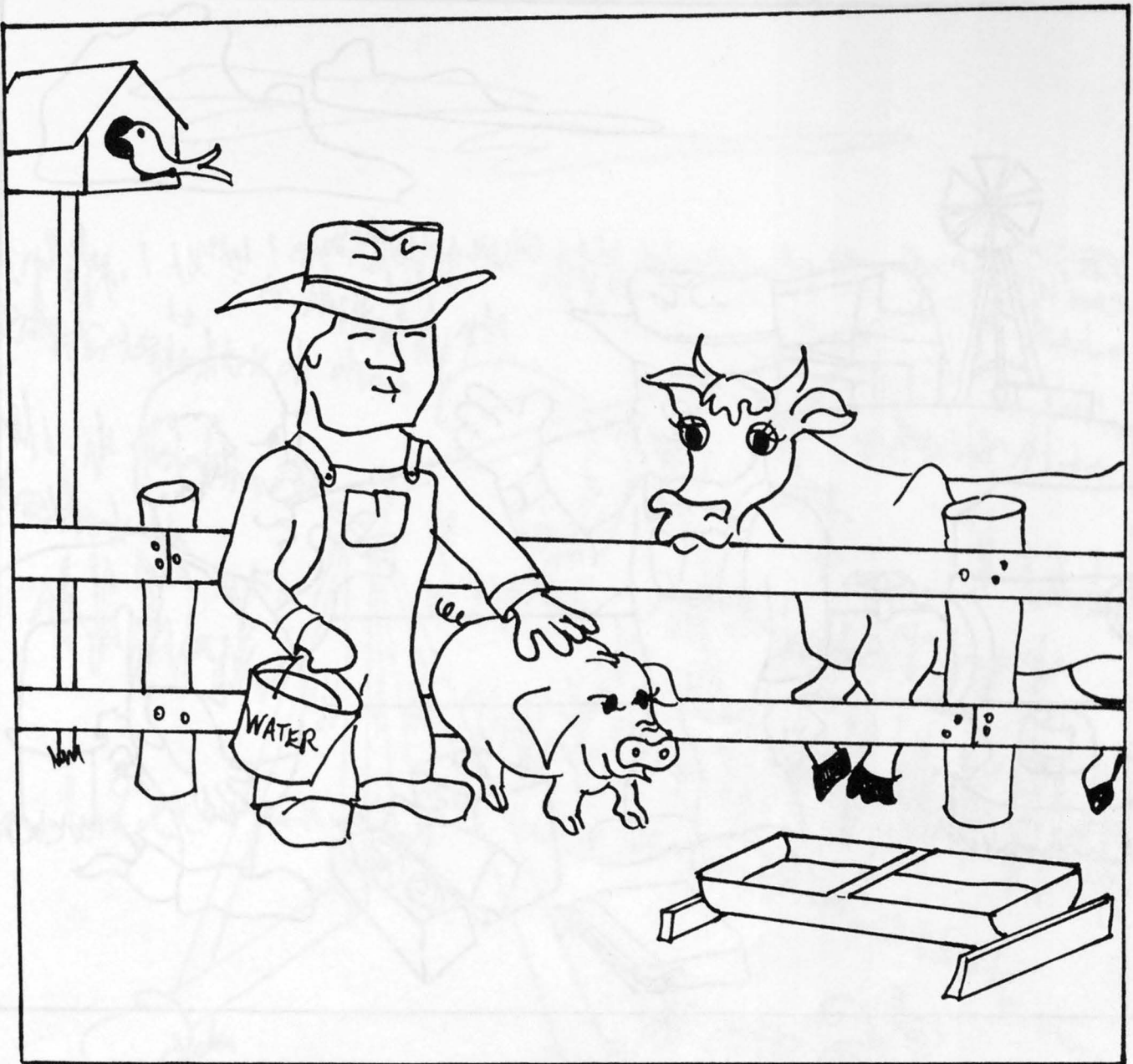
"We can find the ground-water level by noting where this tape is wet," said Uncle Bill. He removed the tape and told Willie the numbers to write on the note sheet.

"Is there a lake underground here?" asked Willie.



"Not exactly," replied Uncle Bill. "There is water stored in the sand and gravel a few feet below us. But this well was drilled into the rock far below us. Water is stored in the cracks of the rock."

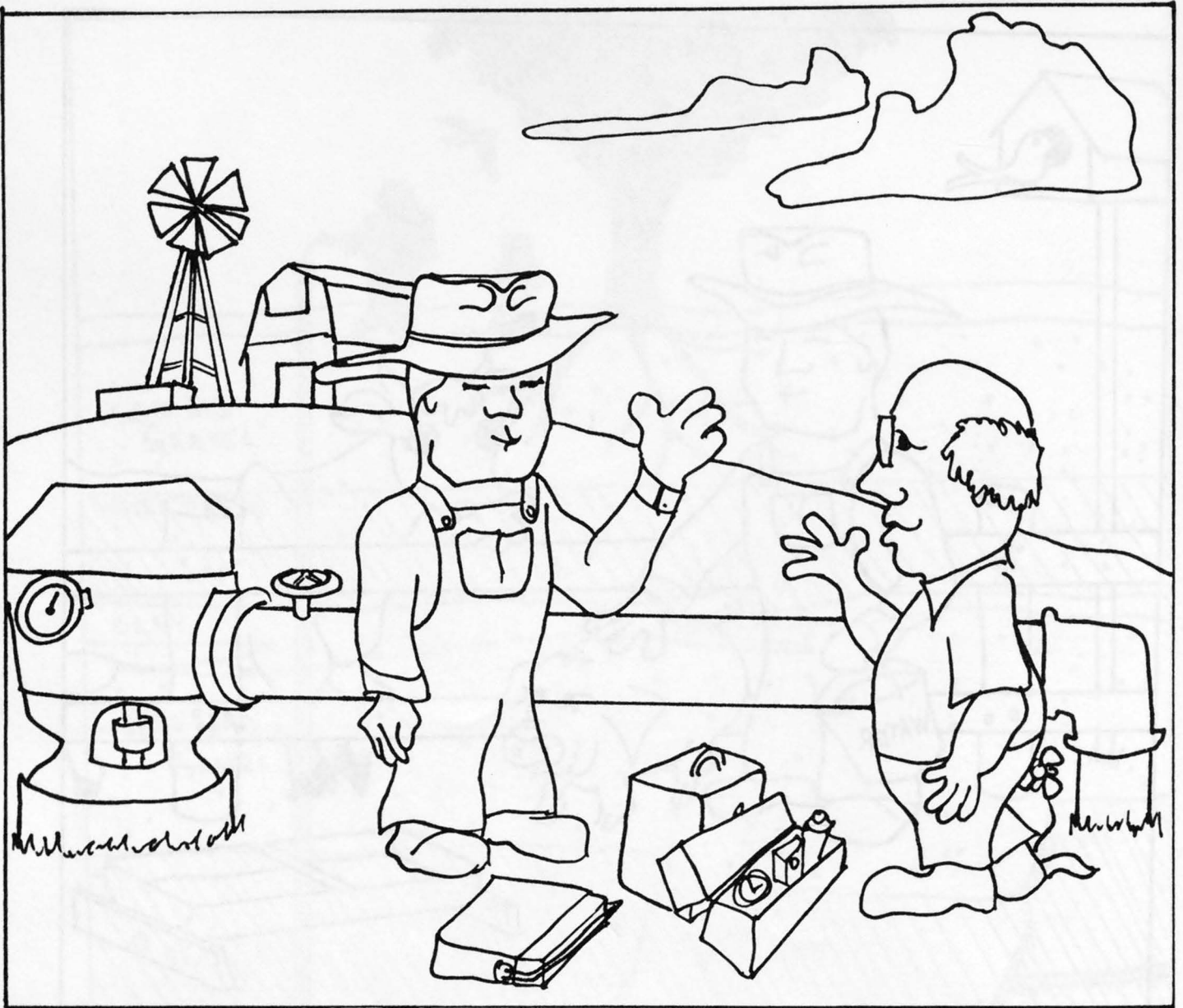
"Do people use that water?" asked Willie.



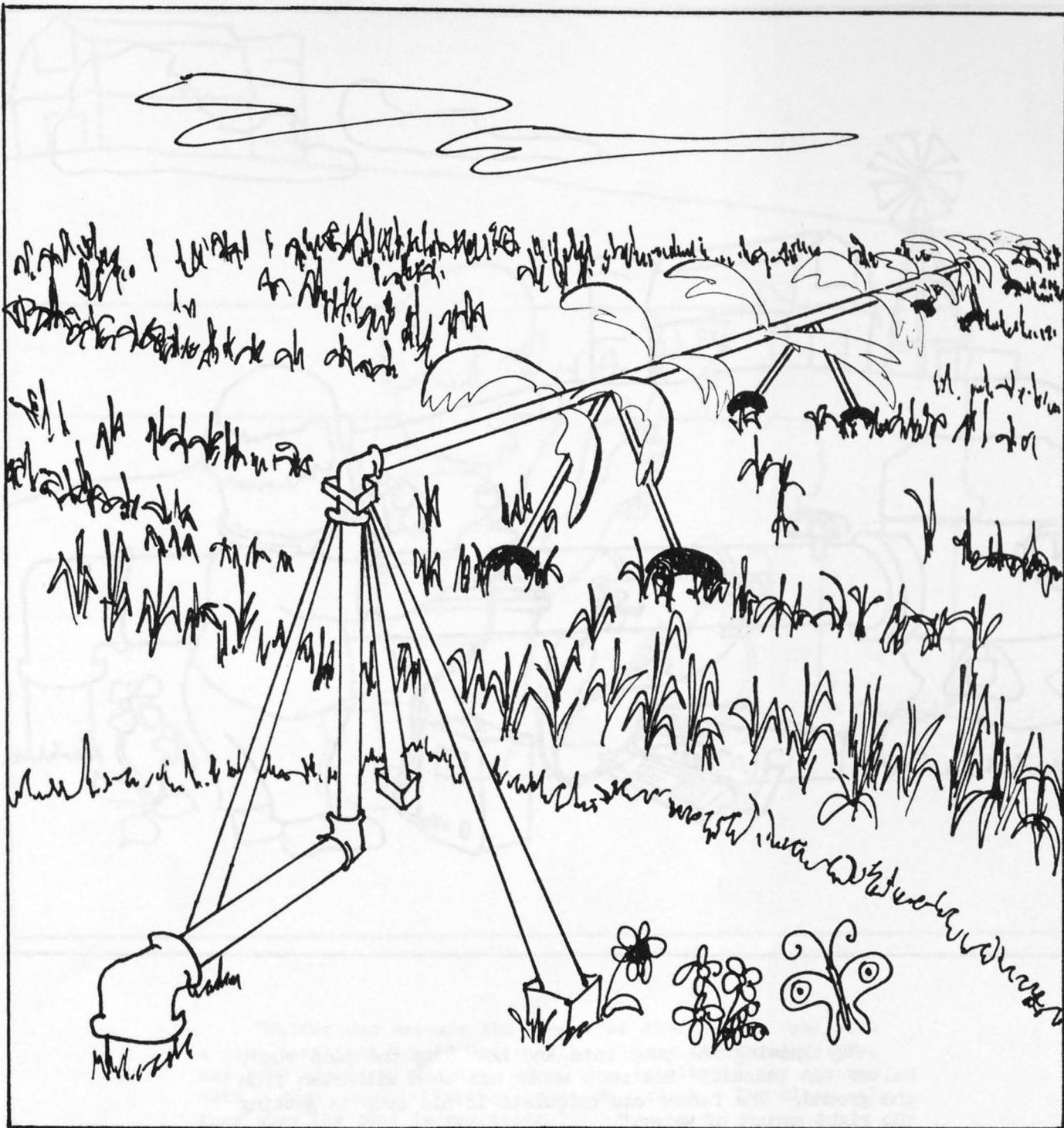
"Yes indeed," said Uncle Bill. "People pump this water for use in their homes. Also, there are several farms in this area. Farmers use the water for their livestock. Some farmers even irrigate their crops."

"How much water does that take?" asked Willie.

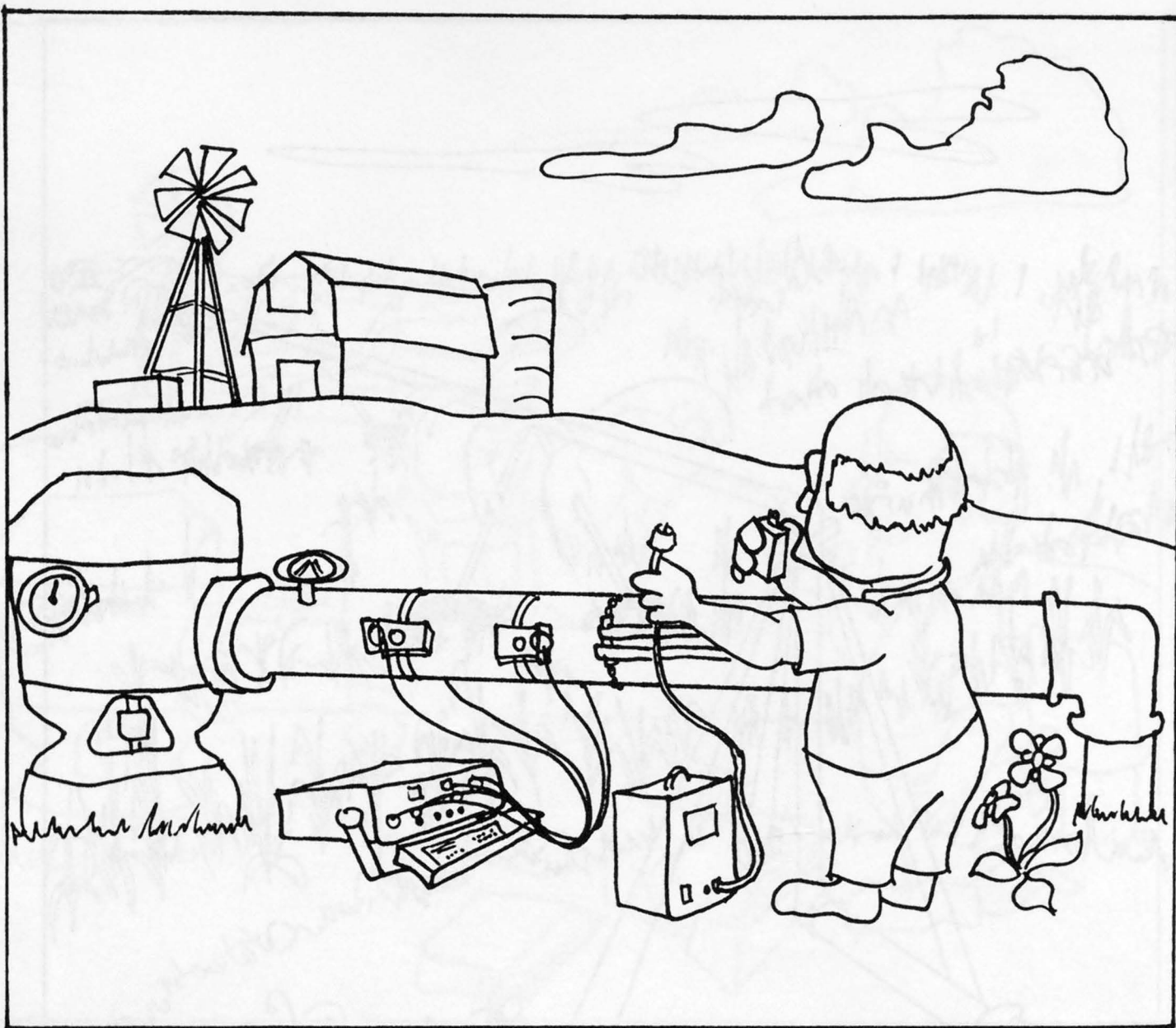
"Well, I guess that depends on the weather," replied Uncle Bill. "The hotter and drier it is, the more water the crop usually needs. The Water Use Specialist in our office, Walter, studies that."



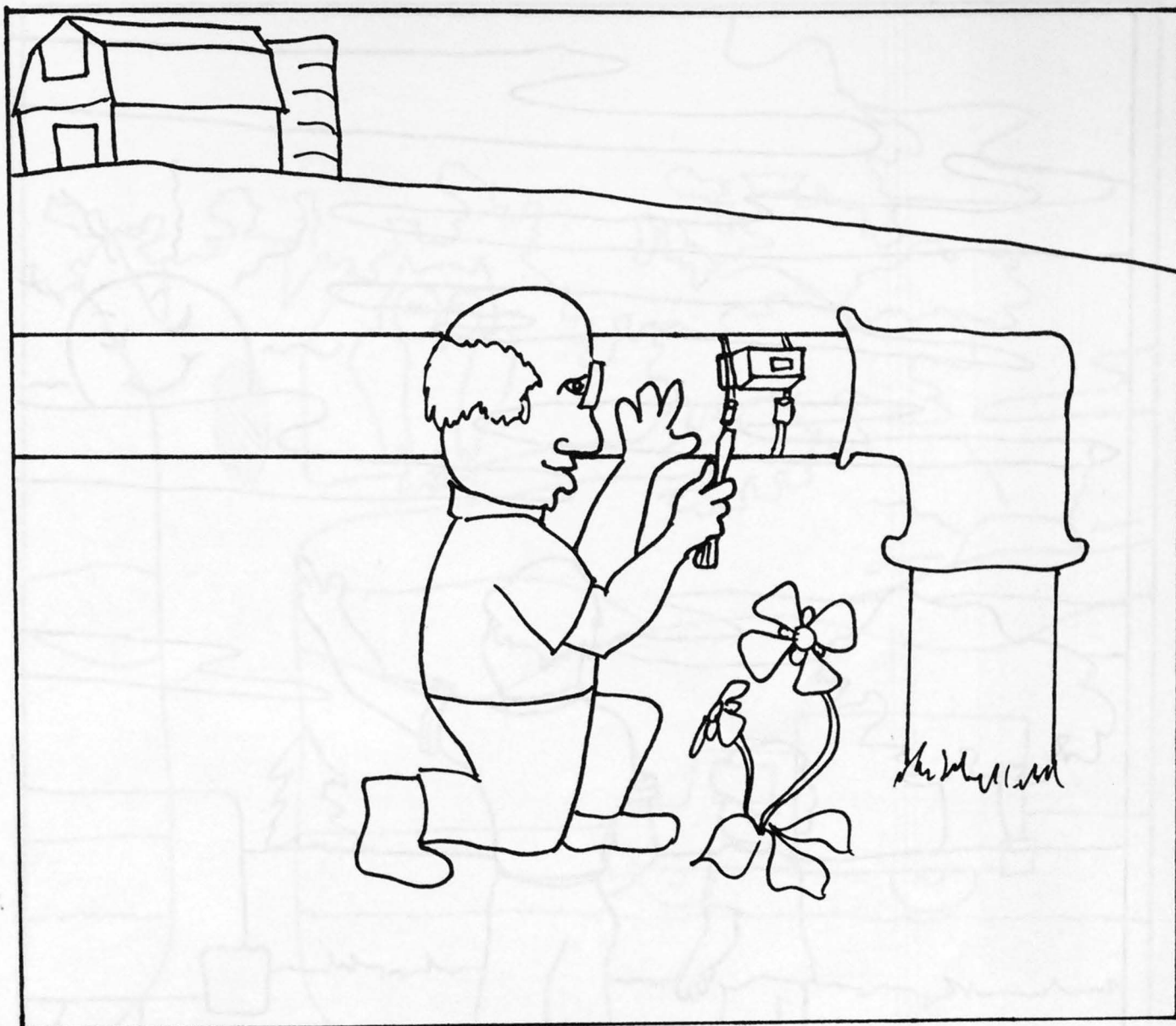
"Walter has some instruments called ultrasonic pipe flowmeters. When he straps these instruments around a pipe, he can measure the amount of water flowing through the pipe. This type of data helps both Walter and the farmer."



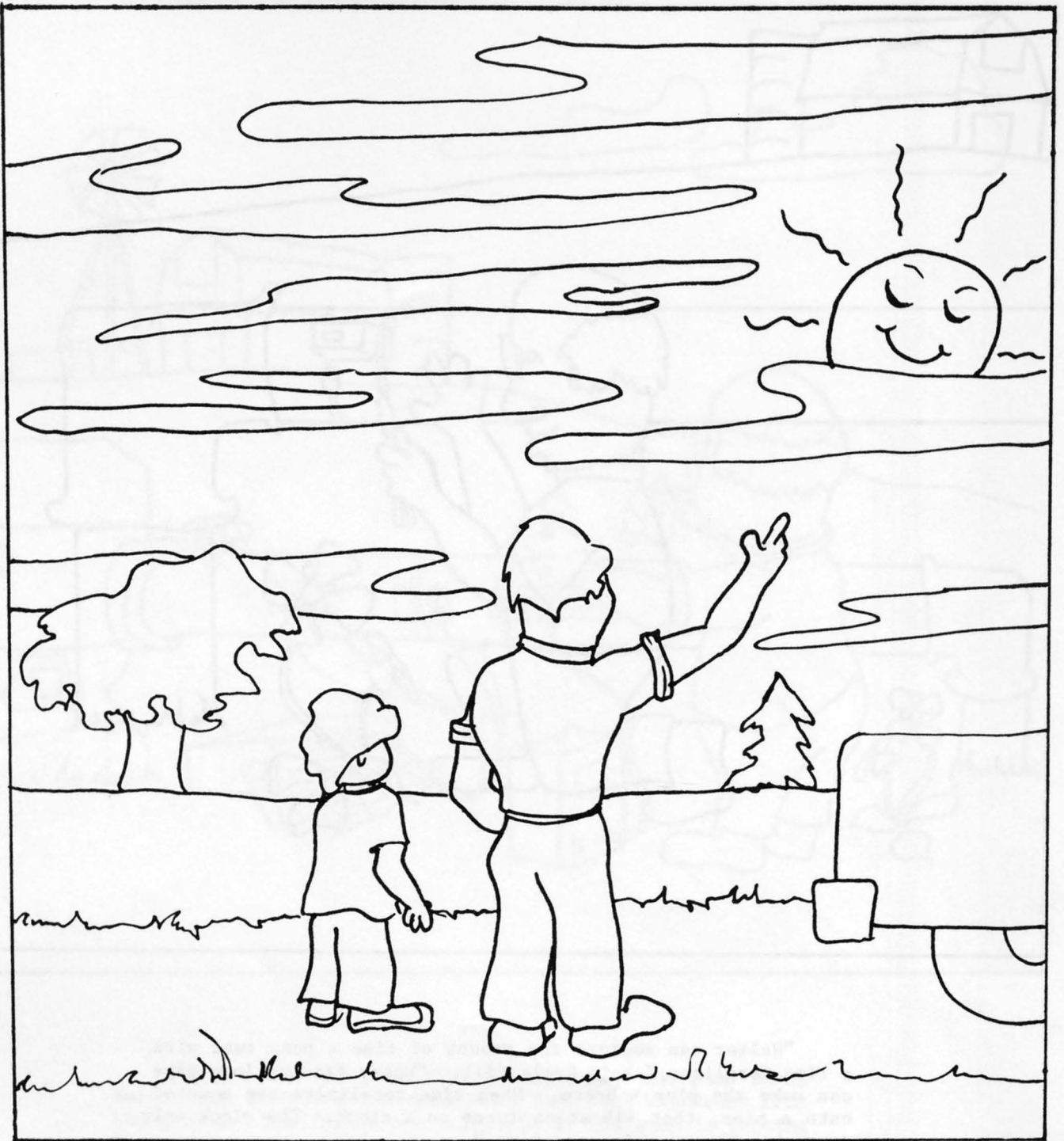
"This summer Walter is doing an irrigation study. He meets with farmers to learn how they get water to their crops."



"By knowing the pump rate and how long the pump runs, Walter can calculate how much water has been withdrawn from the ground. The farmer can calculate if his crop is getting the right amount of water."

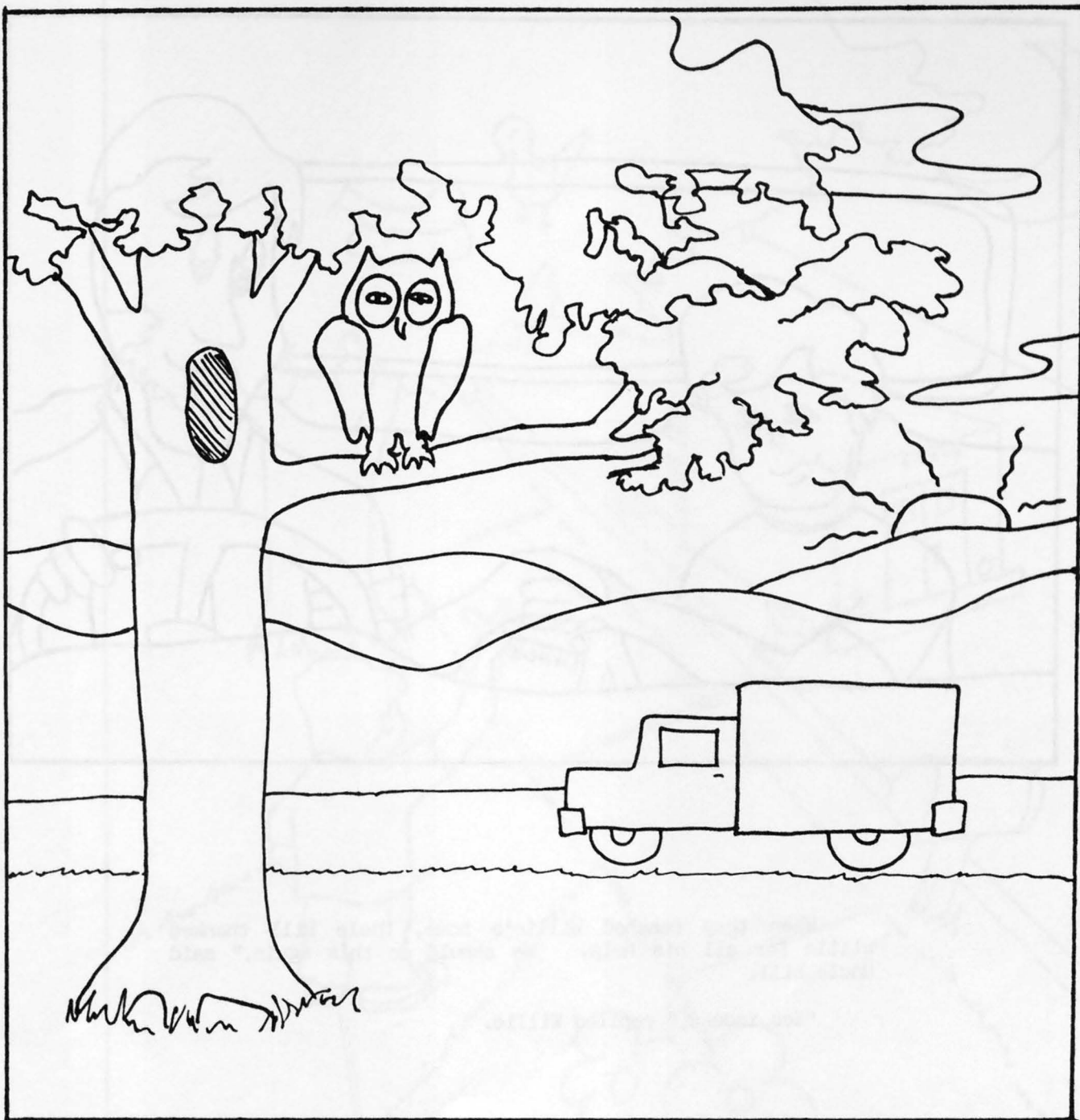


"Walter can measure the amount of time a pump runs with a time totalizer," said Uncle Bill. "Water flowing in a pipe can make the pipe vibrate. When time totalizers are mounted onto a pipe, that vibration turns on a clock. The clock only runs when the pump is operating."

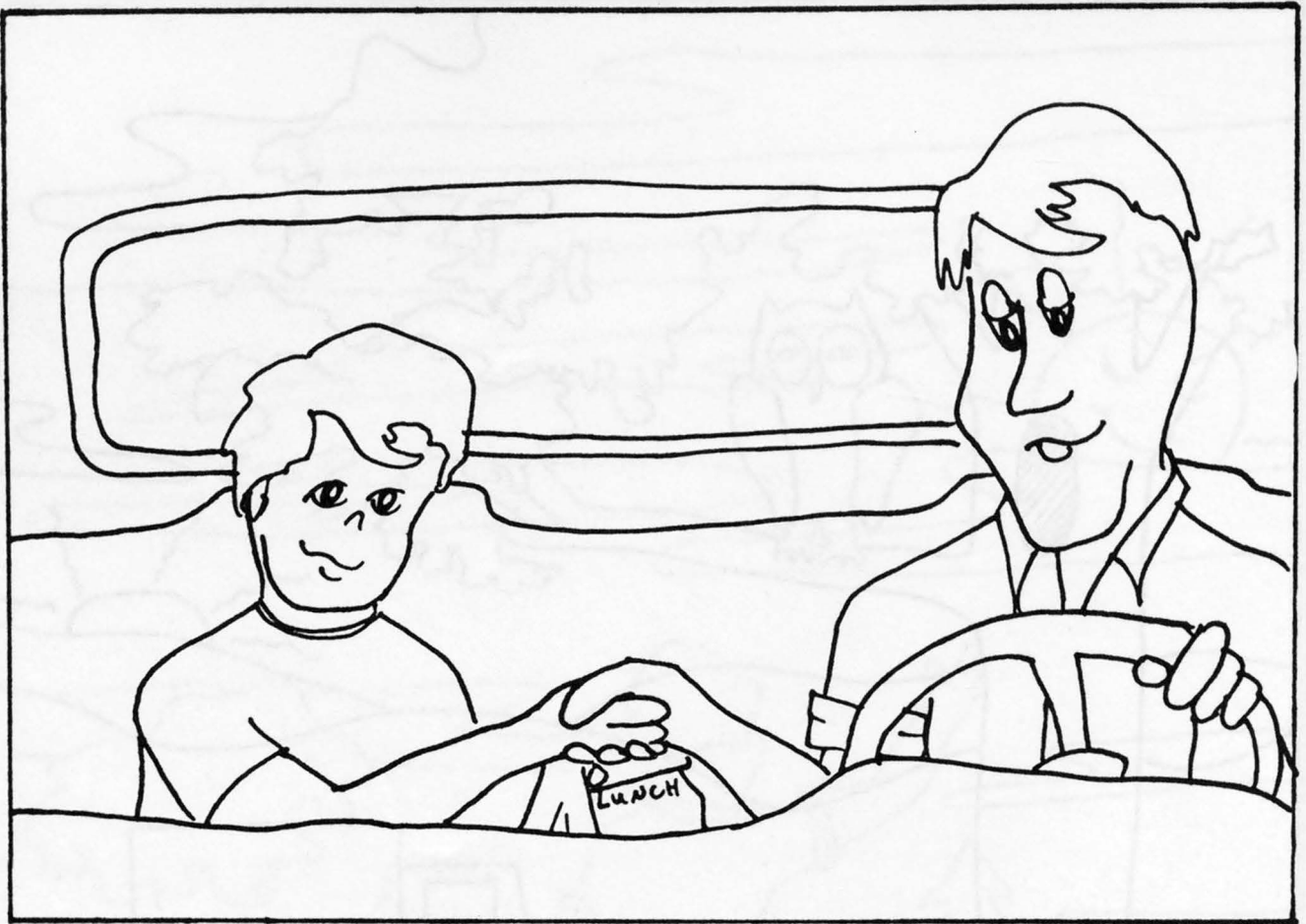


"Speaking of time," said Uncle Bill, "Our work is done and it's time to head on home. The sun will soon be setting."

"The day sure went fast," said Willie.

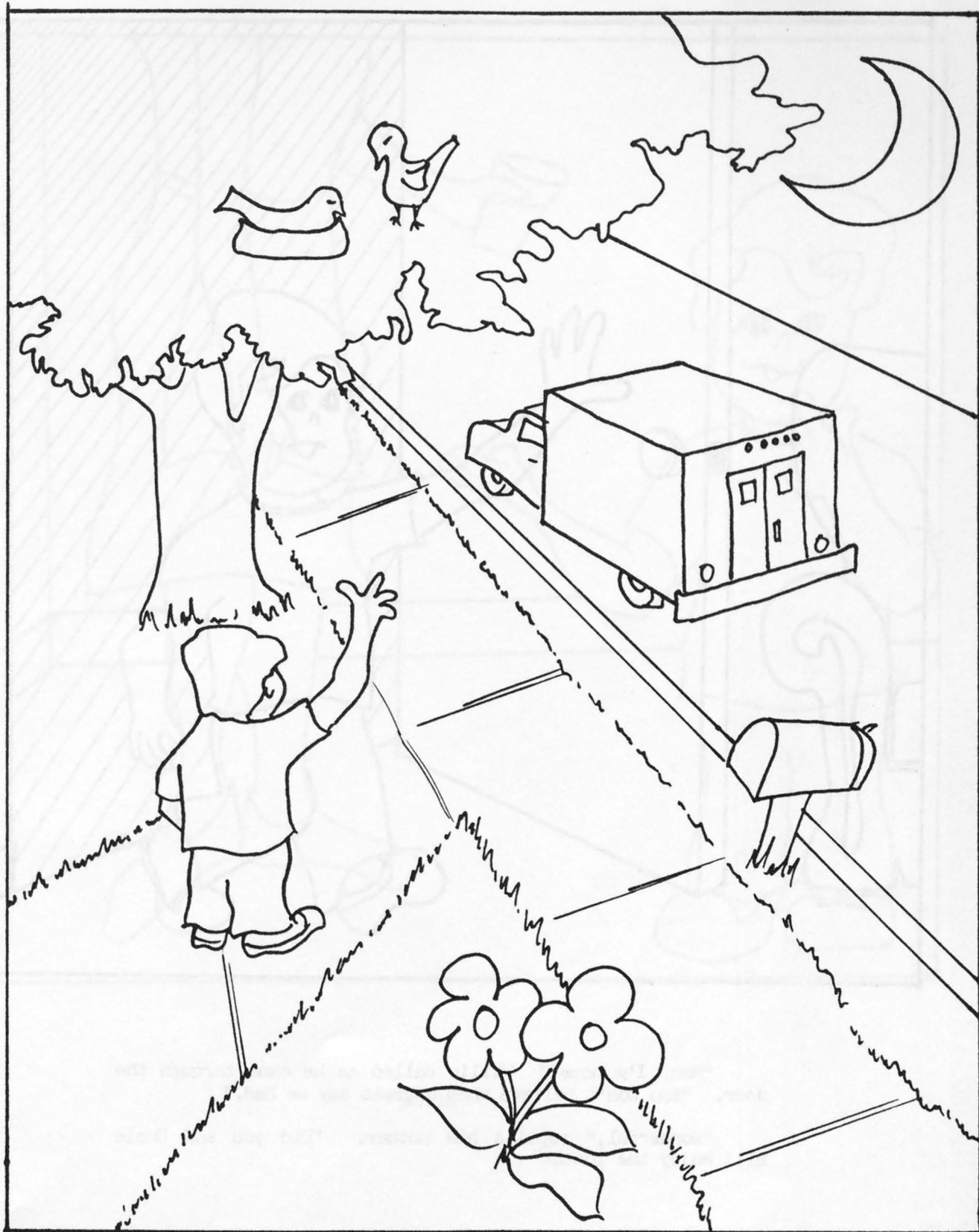


They traveled home, past the farms, through the forests,
and through the towns.

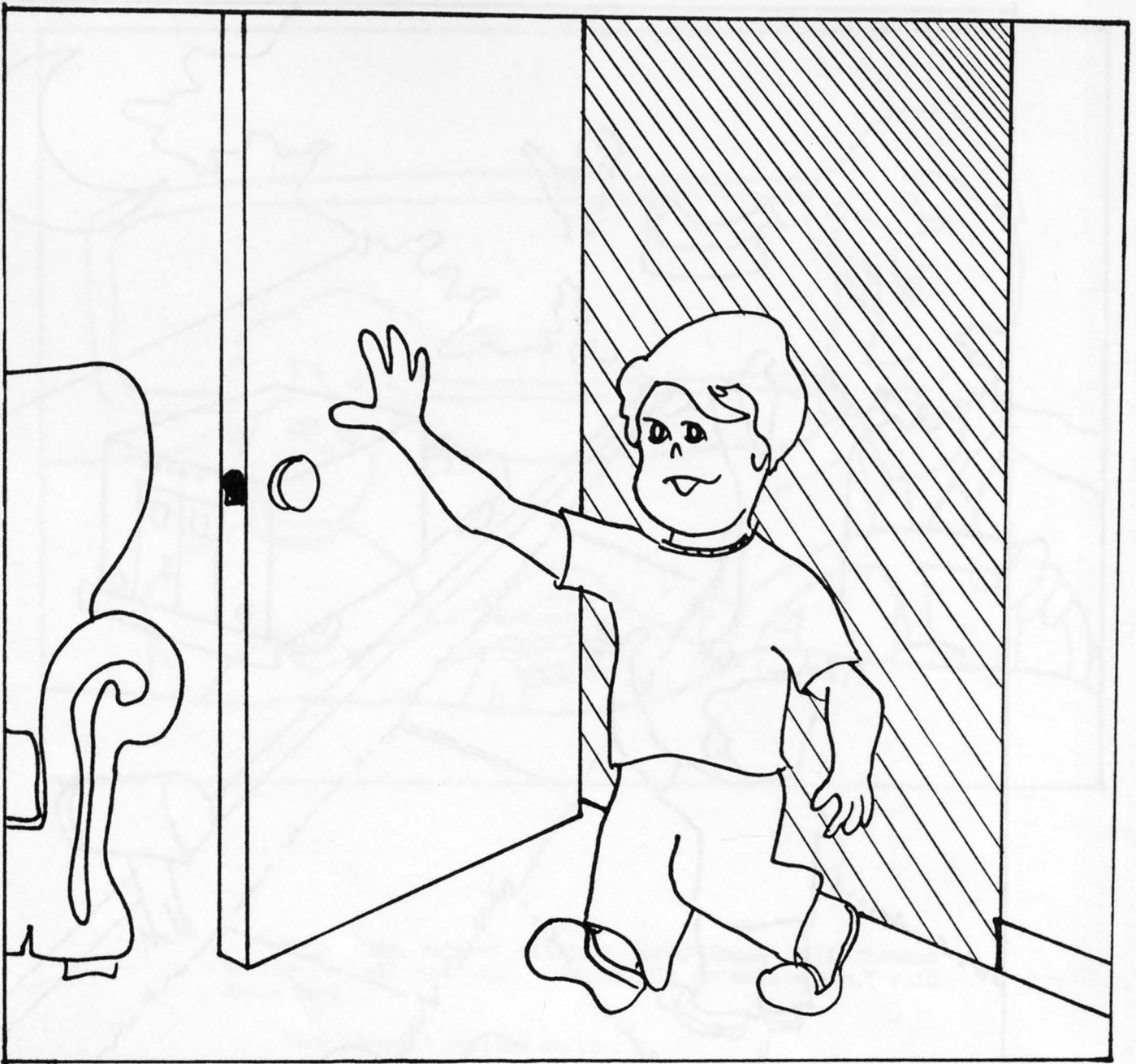


When they reached Willie's home, Uncle Bill thanked Willie for all his help. "We should do this again," said Uncle Bill.

"Yes indeed," replied Willie.

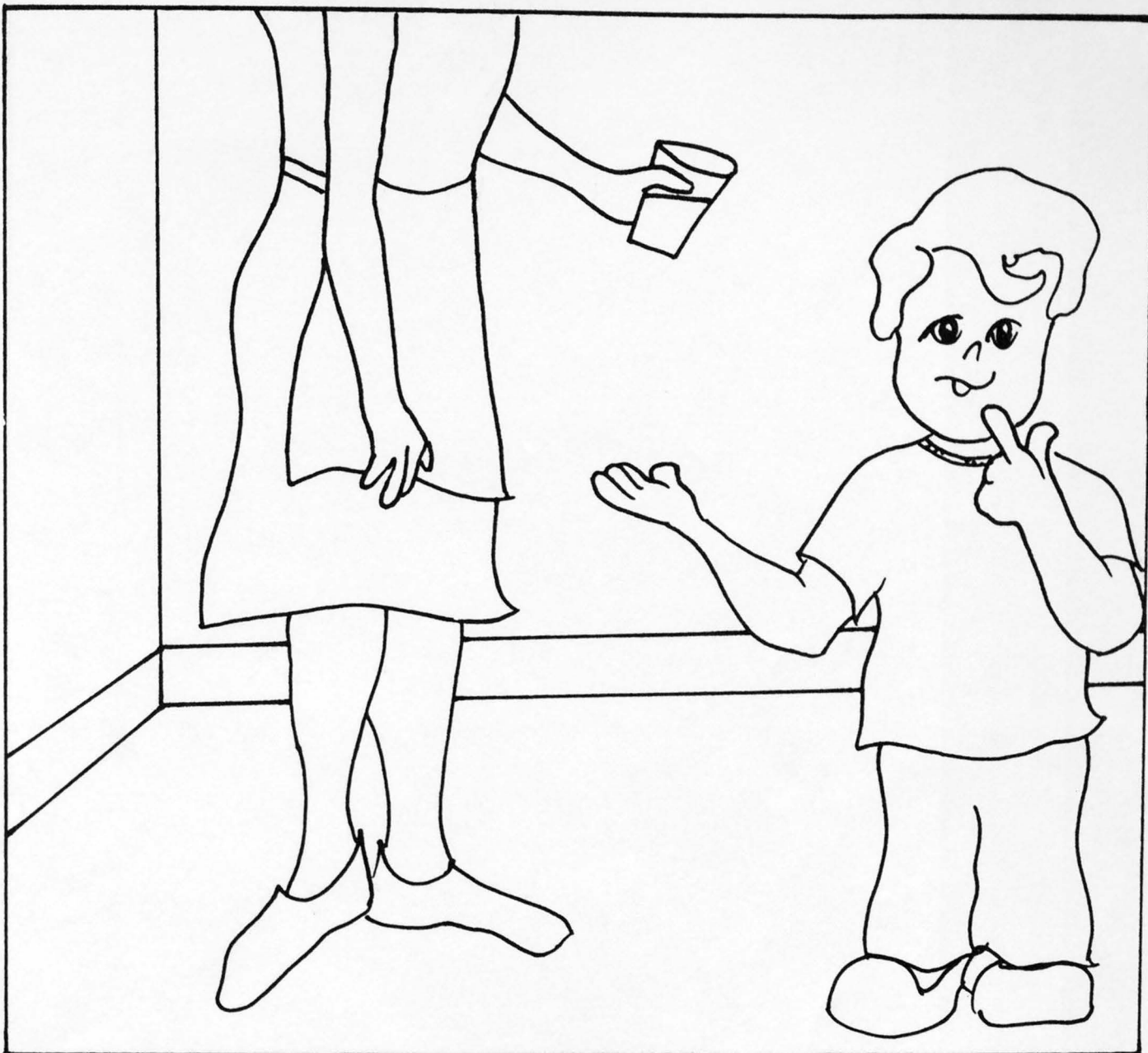


As Willie waved good-bye, he thought of what a great day it had been. "I'll tell Mom all about it," he said to himself.



"Mom, I'm home!" Willie called as he came through the door. "You won't believe what a great day we had."

"Wonderful," replied his mother. "Did you and Uncle Bill enjoy the lunch?"



"LUNCH?"

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