Asset Management

JULY 2013 WORKSHOPS
DALE BARRIE - IRWA
BRENT BESTE - IRWA
Class Schedule

- Welcome and Introductions
- What is Asset Management
- Asset Inventory
- Level of Service
- Criticality
- Life Cycle Costing
- Funding
- Wrap up & CEU’s
WELCOME

Speakers:

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bbeste@iowaruralwater.org
Acknowledgements

Information presented today was originally based on the Asset Management approach of Australia and New Zealand.

WHAT IS ASSET MANAGEMENT?

Asset – A useful or valuable thing, person or quality or property owned by a person or company, regarding as having value.

Management - The process of dealing with or controlling things or people or The responsibility for and control of a company or similar organization.
Asset Management therefore is.....

the management of physical assets (their selection, maintenance, inspection and renewal) and plays a key role in determining the operational performance of a utility

In the simplest terms, Asset Management can be thought of as applied common sense.
Asset Management is an everyday aspect of our lives.....we just don’t think about it.

What do we do if we have a flat tire?

What factors influence our decision?
What if.................

different circumstances or additional information – different decisions?
What if the engine block cracks on the way home?

Now What?
Do you fix the car?
Do you sell the car?

How would you decide?

What factors would go into this decision?
Factors

- Cost of Repair
- How long the repair will last
- Age of the car
- Value of the car
- Condition of the car
- Past experience with the car or other relevant experiences
- Do you have money to pay for the repair?
- Operation and maintenance cost of existing car

- How does spending money on the repair affect other financial needs?
- Cost of a new car (or “new to you” used car)
- How long the new car will last
- Can you get a loan for the new car?
  - What interest rate
  - What payment terms
- Operation and maintenance costs
- Do you still need a car at all? Can you take the bus/train/car pool/bike/walk/car pool?
FACTORS.....
Decision Making Fuels Asset Management

If all your decisions were like the flat tire, a formal program to help you make them would not be needed........

Unfortunately most of the decisions we make with our utilities are more complicated (like the engine block).

Limited funds and competing priorities, needs and availability complicate these decisions.

A program to help you collect the data and provide the framework for these decisions is beneficial.
Asset Management is designed to help utilities with these decisions

In simple terms... it helps decision makers decide how and where to spend money to achieve the desired result - the goal of maintaining a *desired level of service* at the *lowest life cycle cost* for the asset.

*(THIS DOES NOT MEAN NO COST!)*
Asset Management represents a way of thinking about assets

Customer focused

Assets are viewed individually not as a lump (a piece of pipe vs. water distribution system; individual blower vs. aeration system)

Performance is tracked and measured over time by the management/elected officials

Money is spent in the right place for O&M and for capital expenses
What Could Drive Interest in AM?

*Or, What’s in It for Me?*

Better operational decisions - planned vs. reactionary
Greater ability to plan & pay for the future - Sustainable Utility
Better communication – customers, staff, governing body
Increase knowledge & ability to justify needs & prioritize decisions
Ability to benefit from cost savings over time
Capitol projects which meet the true needs of the utility
Five Core Components of AM

1. Asset Inventory (Current State of the Assets)
2. Level of Service
3. Criticality
4. Life Cycle Costing
5. Long-Term Funding
Asset Inventory
What are my assets?

Critical to understand what the utility owns
Not always easy to answer
Out of sight – out of mind
Assets purchased/installed over a long period of time
Records are old, incomplete, inaccurate or missing
Changes in staffing limit historical knowledge
Defining an asset

Anything owned which has value?

Too broad to be workable?

By $$ value?

By ability to repair?
What are some examples of your assets?
Developing the initial inventory

- How much time is available
- What are your resources
- What initial information do you need/want
Where are my assets?

Mapping in the field

Recording in the inventory

Visual picture of location
  ◦ Simple – hand drawn
  ◦ Complex – Geographic Information System (GIS)

The big picture
Choose the type of mapping system that best meets the needs, capabilities and resources of your utility.
- Expense
- Staff capabilities and time
- Accuracy needed
- Portable?
- How comprehensive
- Ability to update/correct

Balance the needs, benefits and resources available.
Brent Mapping Presentation
What are the conditions of my assets?

[ ] Excellent
[ ] Very good
[ ] Good
[ ] Average
[✓] Poor
Developing the Rating System

A condition assessment can be completed in as many ways and you can come up with.... there is no right or wrong way to do it

Consider the capabilities and resources you have available

Be consistent and fair

Makes sense and easy
Assemble a Knowledgeable Group

Use people with current or historical knowledge of the assets
<table>
<thead>
<tr>
<th>Condition Rating</th>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Excellent</td>
<td>Asset is new or nearly new; asset has no known or suspected condition issues</td>
</tr>
<tr>
<td>1</td>
<td>Very Good</td>
<td>Asset has no known or suspected condition issues, but is no longer a new asset</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Asset has few known or suspected condition issues</td>
</tr>
<tr>
<td>3</td>
<td>Average</td>
<td>Asset has known or suspected condition issues</td>
</tr>
<tr>
<td>4</td>
<td>Fair</td>
<td>Asset has known or suspected issues that may impact the asset's ability to continue to perform in the next several years</td>
</tr>
<tr>
<td>5</td>
<td>Poor</td>
<td>Asset has known or suspected condition issues and they are likely to impact the asset's ability to function in the near future (1 to 2 years)</td>
</tr>
</tbody>
</table>
### Table A-2: Condition Rating System Using Letters

<table>
<thead>
<tr>
<th>Condition Rating</th>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>Asset is new or nearly new; asset has no known or suspected condition issues</td>
</tr>
<tr>
<td>B</td>
<td>Very Good</td>
<td>Asset has no known or suspected condition issues, but is no longer a new asset</td>
</tr>
<tr>
<td>C</td>
<td>Good</td>
<td>Asset has few known or suspected condition issues</td>
</tr>
<tr>
<td>D</td>
<td>Average</td>
<td>Asset has known or suspected condition issues</td>
</tr>
<tr>
<td>E</td>
<td>Fair</td>
<td>Asset has known or suspected issues that may impact the asset's ability to continue to perform in the next several years</td>
</tr>
<tr>
<td>F</td>
<td>Poor</td>
<td>Asset has known or suspected condition issues and they are likely to impact the asset's ability to function in the near future (1 to 2 years)</td>
</tr>
<tr>
<td>Condition Rating</td>
<td>Condition</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>0</td>
<td>Excellent</td>
<td>Less than 10% of useful life used up</td>
</tr>
<tr>
<td>1</td>
<td>Very Good</td>
<td>Between 11% and 25% of useful life used up</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Between 26% and 60% of useful life used up</td>
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<tr>
<td>3</td>
<td>Average</td>
<td>Between 61% and 75% of useful life used up</td>
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<tr>
<td>4</td>
<td>Fair</td>
<td>Between 76% and 95% of useful life used up</td>
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<tr>
<td>5</td>
<td>Poor</td>
<td>Between 96% and 100% of useful life used up</td>
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</table>
How old are my assets?

All assets eventually reach the end of their useful life.
What is their remaining useful life?

- Past experience
- Amount of use
- Age
- Operating conditions
- Proper routine and preventative maintenance
- Correct environment
- Manufacture and industry guides
Condition Considerations

- Temperature
- Vibration
- Hours of operation
- Humidity
- Pressure
- Corrosivety of atmosphere
- Visual condition
### Typical Useful Life for Selected Infrastructure Assets

<table>
<thead>
<tr>
<th>Sample Useful Life (Years)</th>
<th>Sample Useful Life (Years)</th>
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<tbody>
<tr>
<td><strong>Water Supply:</strong></td>
<td></td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>50-80</td>
</tr>
<tr>
<td>Treatment Plant Structures</td>
<td>60-70</td>
</tr>
<tr>
<td>Treatment Plant Electrical</td>
<td>15-25</td>
</tr>
<tr>
<td>Water Lines</td>
<td>65-95</td>
</tr>
<tr>
<td>Pumping Station Structures</td>
<td>60-70</td>
</tr>
<tr>
<td>Pumping Station Electrical</td>
<td>25</td>
</tr>
<tr>
<td><strong>Wastewater:</strong></td>
<td></td>
</tr>
<tr>
<td>Gravity Sewer Lines</td>
<td>80-100</td>
</tr>
<tr>
<td>Manholes</td>
<td>20-50</td>
</tr>
<tr>
<td>Pumping Station Structures</td>
<td>50</td>
</tr>
<tr>
<td>Pumping Station Electrical</td>
<td>15</td>
</tr>
<tr>
<td>Risers</td>
<td>25</td>
</tr>
<tr>
<td>Treatment Plant Structures</td>
<td>50</td>
</tr>
<tr>
<td>Treatment Plant Electrical</td>
<td>15-25</td>
</tr>
</tbody>
</table>
What is the value of my assets?

Installation/original purchase cost?
Replacement cost?
Insured value?

While the idea behind valuing assets is relatively simple, obtaining replacement costs is no small task - initially start with estimates or leave blank and add information as it becomes available.
Are my assets energy efficient?

- Current utility (gas/electric) costs
- Replacement or upgrade costs
- Return on investment
## Asset Inventory - Source Water

<table>
<thead>
<tr>
<th>Location</th>
<th>Category</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Install Date</th>
<th>Condition</th>
<th>Energy user Y/N</th>
<th>Comments</th>
<th>Criticality</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Field</td>
<td>Well</td>
<td>Well # 3</td>
<td></td>
<td>8</td>
<td>Y</td>
<td></td>
<td></td>
<td>2.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Well Field</td>
<td>Well</td>
<td>Well #4</td>
<td></td>
<td>8</td>
<td>Y</td>
<td></td>
<td></td>
<td>3.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Level of Service (LOS)

Water utilities are in the business of providing safe, reliable drinking water at an acceptable pressure.

Wastewater utilities are in the business of treating and discharging wastewater in an environmentally sound manner.

Expressing how the utility will meet customer expectations is called the Level of Service (LOS)
Level of Service

> Mission statement
> Describes the goals of the utility
> Addresses the expectations of your customer
> Measurable
> Ability to track performance
> Serves as an internal guide
> Tool for communication
> Start simple
What do I want my assets to do?

Maximum Level = Operate at the Physical capabilities of the Assets

Your Choice

Minimum Level = Just Meet All Regulatory Requirements
Determining Goals

Can I measure my goals?

How will I measure them?

What data do I need – is it available?

Will these goals help us to better serve our customers and make better operational/managerial decisions?
Examples of Goals

POOR

The wastewater plant will work on odors.

The water system will provide sufficient water pressure.

GOOD

The wastewater plant will strive for less than 4 odor complaints per year.

The water system will provide a minimum of 35 psi to its service area at least 95% of the time.
Key factors in setting goals

Keep it simple
Important
Measurable
With in capabilities
Engage both staff and customers
Balancing Level of Service and Cost
Measuring and adjusting Level of Service
Reviewing Goals

Was the goal met?

Were the cost of meeting the goal within normal operation?

Were the customers satisfied with the results?

Was staff satisfied with the result (including time taken to determine result)?

Were decision makers satisfied?
Water Quality Standards – The utility will strive to meet all federal and state water quality standards. Compliance with this goal will be reported to the council during monthly meetings and to the consumer via the annual water quality report (CCR).

Water Loss – The utility will have a goal of lowering unaccountable water loss to 15% or less. Monthly water audits with a running annual average will be completed and reported to the council.

Water Leaks – Water leaks, when found, will be repaired in a timely manner to ensure the integrity of the water system and to lower water loss. Leaks will be tracked and recorded to provide information to the council to assist with long term planning for the system.

Water Pressure – The goal of the system will be to supply water pressure at a minimum of 30 psi at all time within the system. Should an adverse condition (electrical outage, main breaks, etc.) occur the goal will be to have no customer without water for more than 8 hours.

Aesthetics – The goal of the system will be to provide water which meets EPA’s secondary standards related to aesthetic quality of the water (taste, odor, color & hardness).

Complaints – The goal of the system will be to investigate all customer complaints within 2 business days.
Table Top Exercise

List of 10 (descriptions and pictures) – pick the 5 assets you wish to include

Develop a rating system & rate your assets

Estimate/determine age

Remaining useful life

Estimated value

Energy user (efficiency)
Spreadsheet Development
Criticality

Not all assets are equally important to a utility’s operation

Same asset not as critical to every utility

You must look at your own assets based on your utility
Two parts to criticality

How likely is the asset to fail?

What is the consequence if it does fail?
Probability (likelihood) of Failure

Four modes by which an asset may fail
Physical Mortality

The asset physically fails
Financial Inefficiency

High cost of operation and maintenance makes it no longer economical to keep in operation.
Capacity

Asset still operational, but unable to provide needed capacity.
Level of Service

Asset still operate rational but unable to meet the level of service required.
Probability of Failure Rating System

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Low</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>Very High</td>
</tr>
</tbody>
</table>
Consequence of Failure
Cost/Time of repair or replacement

Is it a minor repair?
Do you have redundancy?
Do you have repair parts or do they need to be ordered?
Is the failure so expensive or catastrophic does it require the replacement of the asset?
Social Impact

Inconvenience to the customer
Collateral Damage
Legal Costs
Environmental Impacts
Public Health Impacts
Reduction in Level of Service

Assets must be in working order to deliver the desired level of service.

Consider the level of impact the asset failure has on your level of service desired.
Redundancy

Never too much of a good thing!
Assessing Criticality

Really is Risk Analysis – probability & consequence of failure
Consequence of Failure Rating System

<p>| | |</p>
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<td>4</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>Very High</td>
</tr>
</tbody>
</table>
Criticality Determination

Which category of assets do I care the most about, the least?

[Diagram showing a matrix with axes labeled Probability of Failure and Consequence of Failure, with high risk and low risk categories depicted.]

Consequence of Failure

Probability of Failure
Criticality Calculations
Life Cycle Costing

Heart of asset management
How much/what type maintenance
When to replace
Components of Life Cycle Costing

Initial Cost
O&M expenses
Repair costs
Rebuild/Rehabilitation Costs
Disposal costs
Legal, environmental or social costs
Let's say you spent $70,000 in your distribution O&M Budget.
But what if I gave you additional information?

- Pipe repair/maintenance: $60,000
- Meter/Service lines: $5,000
- Well maintenance: $2,000
- Chemicals: $1,000
- Tank maintenance: $1,000
- Hydrant/Valve maintenance: $1,000
One step further

<table>
<thead>
<tr>
<th>Material</th>
<th>Size</th>
<th>Cost</th>
</tr>
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<tbody>
<tr>
<td>Cast Iron</td>
<td>&lt;12 inches</td>
<td>$40,000</td>
</tr>
<tr>
<td>Cast Iron</td>
<td>&gt;12 inches</td>
<td>$5,000</td>
</tr>
<tr>
<td>PVC</td>
<td>&lt;12 inches</td>
<td>$5,000</td>
</tr>
<tr>
<td>PVC</td>
<td>&gt;12 inches</td>
<td>$2,000</td>
</tr>
<tr>
<td>Asbestos Cement</td>
<td>&lt;12 inches</td>
<td>$7,000</td>
</tr>
<tr>
<td>Asbestos cement</td>
<td>&gt;12 inches</td>
<td>$1,000</td>
</tr>
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</table>
And going even farther

<table>
<thead>
<tr>
<th>Install Date</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930s</td>
<td>$2,000</td>
</tr>
<tr>
<td>1940s</td>
<td>$5,000</td>
</tr>
<tr>
<td>1950s</td>
<td>$20,000</td>
</tr>
<tr>
<td>1960s</td>
<td>$3,000</td>
</tr>
<tr>
<td>1970s</td>
<td>$5,000</td>
</tr>
<tr>
<td>1980s</td>
<td>$5,000</td>
</tr>
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</table>
Operation and Maintenance costs

Routine Maintenance
Planned Maintenance
Preventative Maintenance
Corrective Maintenance
Questions to ask

Is there maintenance I am doing that I should continue?
Is there maintenance I am doing that I should discontinue?
Is there maintenance I am not doing that I need to start?
Is there maintenance I am not doing that should stay that way?
Run to Failure

Low risk assets
Low cost
May be most economical option
Full life span
Repair – Rehabilitate - Replace

When asset fails how do you decide?
Repair

Will the repair bring the asset back to near new condition?
Will the repair keep the asset operational for an extended period of time?
What condition is the asset in?
Rehabilitate

Will the rehabilitation bring the asset back to original installed condition?

Is the rehab costs less than the replacement costs?

Is the additional useful life worth the expense?
Replacement

Is there newer technology?
Will the operational costs be lower (more energy efficient)?
<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Costs</td>
<td>$2,000,000</td>
<td></td>
</tr>
<tr>
<td>Est. Life (yrs)</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Life costs</td>
<td>$40,000</td>
<td></td>
</tr>
<tr>
<td>Annual Maint/yr</td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td>Extended (yrs)</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Life costs w/m</td>
<td>$30,000</td>
<td></td>
</tr>
<tr>
<td>Rebuild @ 75yr</td>
<td>$500,000</td>
<td></td>
</tr>
<tr>
<td>extended (yrs)</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Life cost m&amp;rb</td>
<td>$23,333</td>
<td></td>
</tr>
</tbody>
</table>
What funding do we need to properly operate the assets?

Where will the funding come from?

- Capital Improvement
- Operation & Maintenance
- Impact Fees
- Grants
- Customer Rates
- Taxes
- Special Funds
- Loans
- Customer Fees
- Bonds
- Customer Fees
External Funding

Governmental loan/grants
Private loans
Bonds
Internal Funding

Rates

Fees
Rate setting

Determine your costs
Determine your current & needed revenues
Reserve needs
Current financial condition
Production and use data
Current and future debt
Fair and equitable
Utilities need to develop a comprehensive funding strategy in order to remain sustainable into the future and provide their customers with the level of service desired at the lowest cost possible (not no cost).
Implementation of Asset Management

Just “do it” philosophy
Start small – baby steps
Implement what you can - You don’t have to do it all
Be flexible
Adjust and adapt as you move forward
Realize there may be initial resistance until benefits are seen
Real world

Asset Management Plan

Courtesy of Dan Van Langen, Public Works Director
DeSoto, Iowa
Established in 1868 by the railroad
Population: 1050
Location:
15 Miles west of Des Moines on Interstate 80
DeSoto provides water & waste water services to approximately 450 customers.
The City provides water and waste water utilities to our residents

Maintains City Streets

Maintains all Public Facilities, including Building and Grounds

Care for the City Parks and Cemetery

…..and anything else that they ask us to do
DeSoto’s Insured Assets Value

$ 3,391,699.00

Property - $2,755,486
Buildings, Property, etc.

Inland Marine - $151,256
Tools, Mowers, etc.

Autos - $487,957
Police, Fire, Public Works
DeSoto, Iowa.......................... 1050 People (420 Families)

Nearly

3.5 MILLION
in ASSETS

....Yes, hammering the point! A PLAN IS NEEDED!
Some of the Problems?
Please!!
NO
MORE
PAPER
WORK!
Got Time?
Solutions

Keep it simple
Don’t overdo it
Baby steps
Keep progressive
Don’t be in a hurry
Find the time a few hours a week
It’s our responsibility, as operators to convince our City Councils and Boards that this plan has merit and will be a benefit to the City.

A benefit for those who follow in their footsteps.

……change can be for the better.
Inventory Opportunities

We found that this gave us an opportunity to create a maintenance program for a CLA-VAL we have in service as well as develop a “how to” guide for those who follow in our footsteps.

House Cleaning - What a great time to get rid of the junk that the last 3 operators before you never used!
Mapped Area of City Assets

Water Treatment Plant
  Well #3
  Well #4
New Water Tower
Old Water Tower
Altitude Valve
City Hall
City Shop
Bulk Water Sales Building
Waste Water Treatment
Oakhill Lift Station
LOS example

**Water Quality Standards** – The utility will strive to meet all federal and state water quality standards. Compliance with this goal will be reported to the council during monthly meetings and to the consumer via the annual water quality report (CCR).

**Water Loss** – The utility will have a goal of lowering unaccountable water loss to 15% or less. Monthly water audits with a running annual average will be completed and reported to the council.

**Water Leaks** – Water leaks, when found, will be repaired in a timely manner to ensure the integrity of the water system and to lower water loss. Leaks will be tracked and recorded to provide information to the council to assist with long term planning for the system.

**Water Pressure** – The goal of the system will be to supply water pressure at a minimum of 30 psi at all time within the system. Should an adverse condition (electrical outage, main breaks, etc.) occur the goal will be to have no customer without water for more than 8 hours.

**Aesthetics** – The goal of the system will be to provide water which meets EPA’s secondary standards related to aesthetic quality of the water (taste, odor, color & hardness).

**Complaints** – The goal of the system will be to investigate all customer complaints within 2 business days.
Criticality Analysis of Assets

- MCC 1 – Cutler Hammer, Freedom Series 2100
- Flow Meter
- Water hammer prevention valve
- Gate valve
- Butterfly Valves (2)
- Kersey Line 3/4 inch meter
- Out of town line 2 inch meters (2)
- Chlorine pump
- Fluoride pump
- Polyphosphate pump
- CPWplus Scales (2)
- Chlorine Pocket DR800 series
- Iron Pocket Colormeter II
- Phosphate Pocket Colormeter II
- Fluoride Pocket Colormeter II
- Eye wash station
- Generator
- Manual Transfer Switch
- Electric heaters (2)
- Dehumidifier
- Hose bib backflow preventors (3)
- Well #3
Complete work on Assets at Water Treatment Plant

Present plan to City Council

Begin work to inventory assets at Waste Water Treatment Plant

Implement Asset Management in the operations of our Public Works Department
Questions?
## CEU’s & Evaluations

<table>
<thead>
<tr>
<th>Schedule #</th>
<th>Date</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>17725</td>
<td>7/9</td>
<td>Asset Management Workshop</td>
<td>Waverly</td>
</tr>
<tr>
<td>17721</td>
<td>7/11</td>
<td>Asset Management Workshop</td>
<td>Cherokee</td>
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