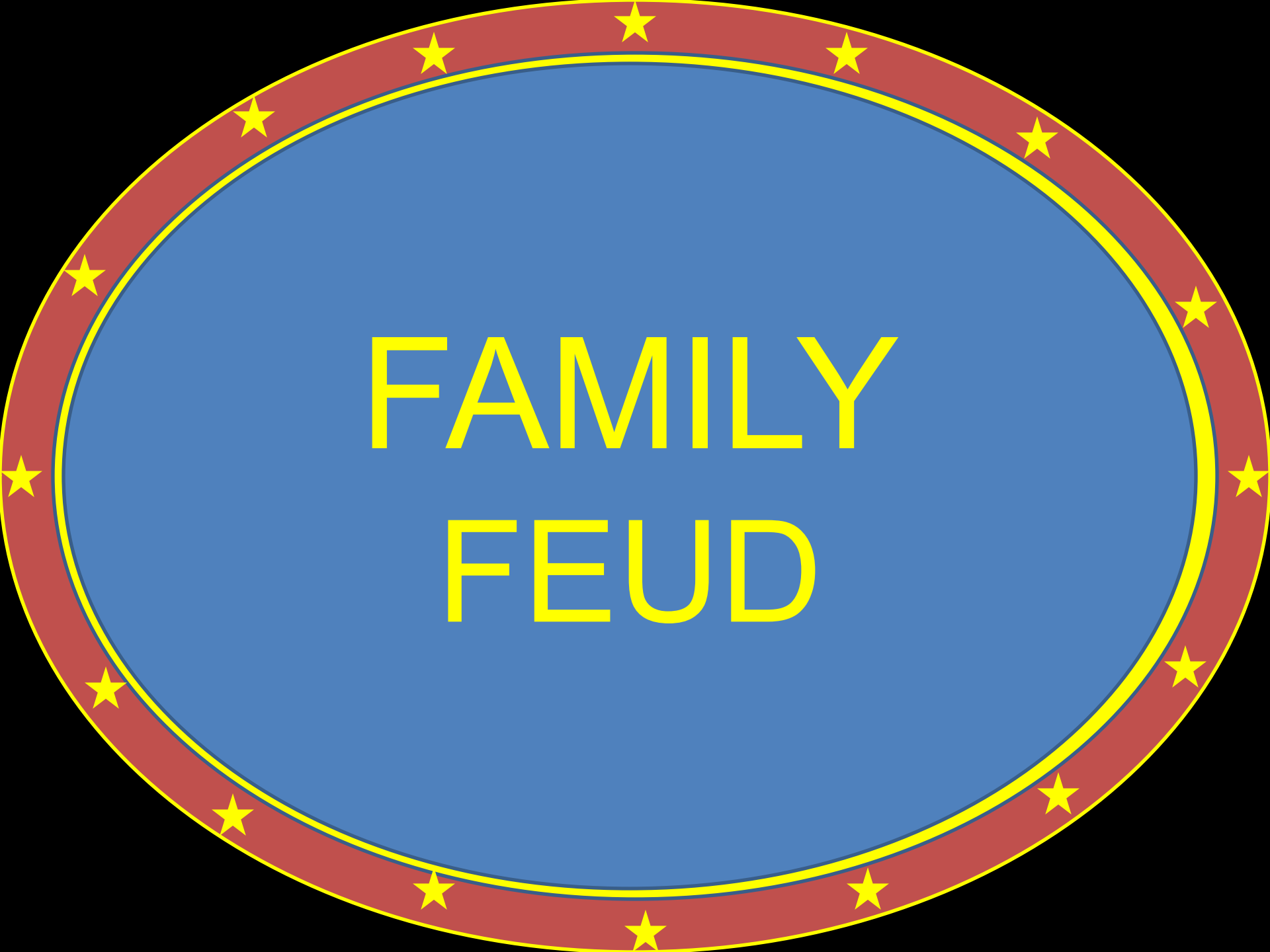


Combined Waste Stream Formula

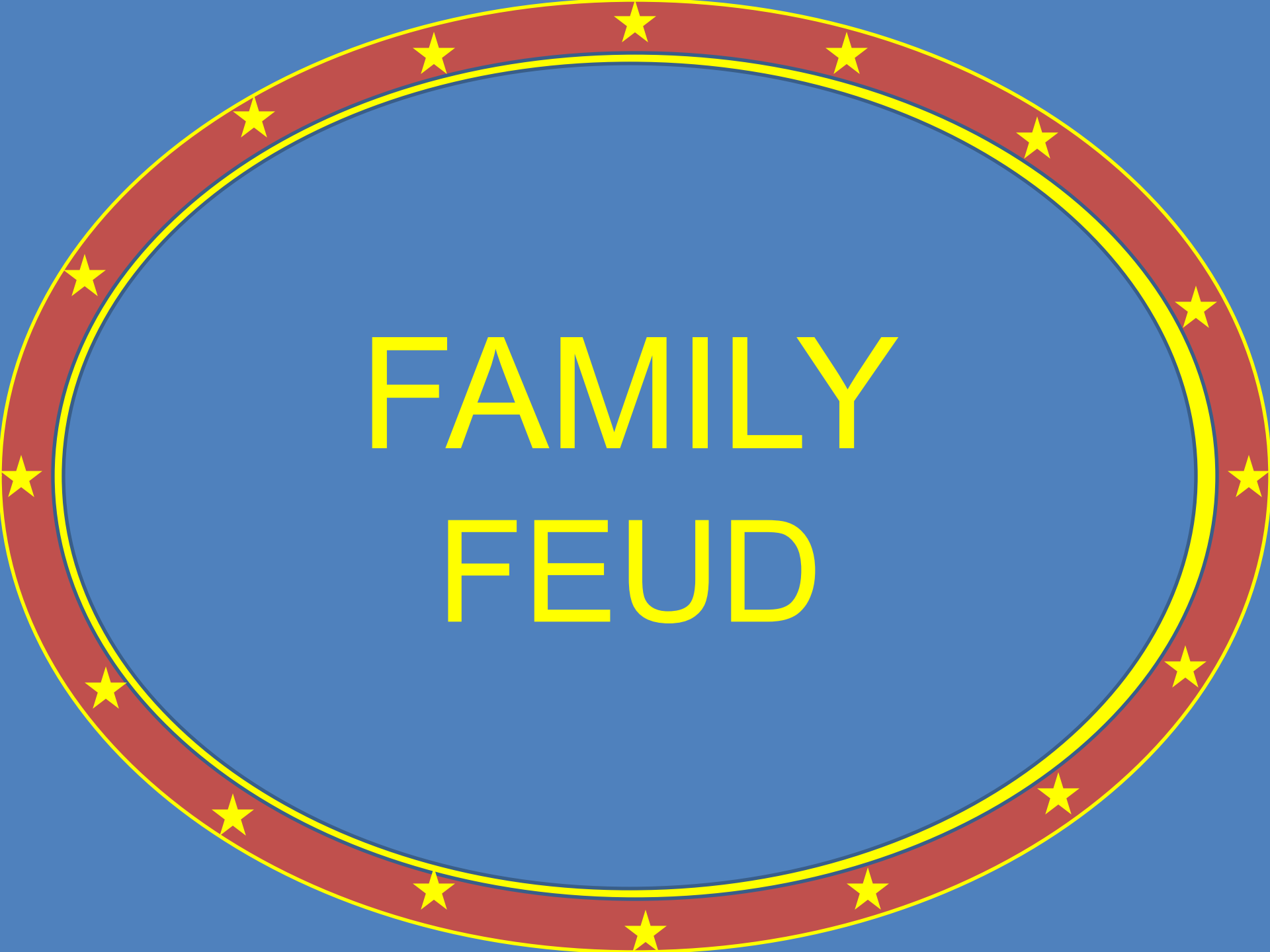


UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
**WATER
QUALITY**

**Sarah Leavitt
Ward**

The logo for the game show 'Family Feud' is an oval shape. It features a central blue area with the words 'FAMILY FEUD' in yellow, bold, sans-serif capital letters. This central area is surrounded by a red border, which is further enclosed by a yellow border. Small yellow stars are placed at regular intervals along the red border.

FAMILY
FEUD



FAMILY
FEUD

How to Play

- Family Feud consists of two teams who compete with each other to correctly guess the most popular responses to survey questions in order to win!
- For every answer a team guesses correctly, that team receives a certain number of points that corresponds to the number of surveyed people who gave that answer or information from the regulation. So if 36 people said a cat was their favorite pet, and your team guessed “cat,” you would get 36 points. The first team to reach 300 points, wins!

Thoughts about the Combined Wastestream Formula





XX





What is that?



How am I supposed
to do that?



Oh crap

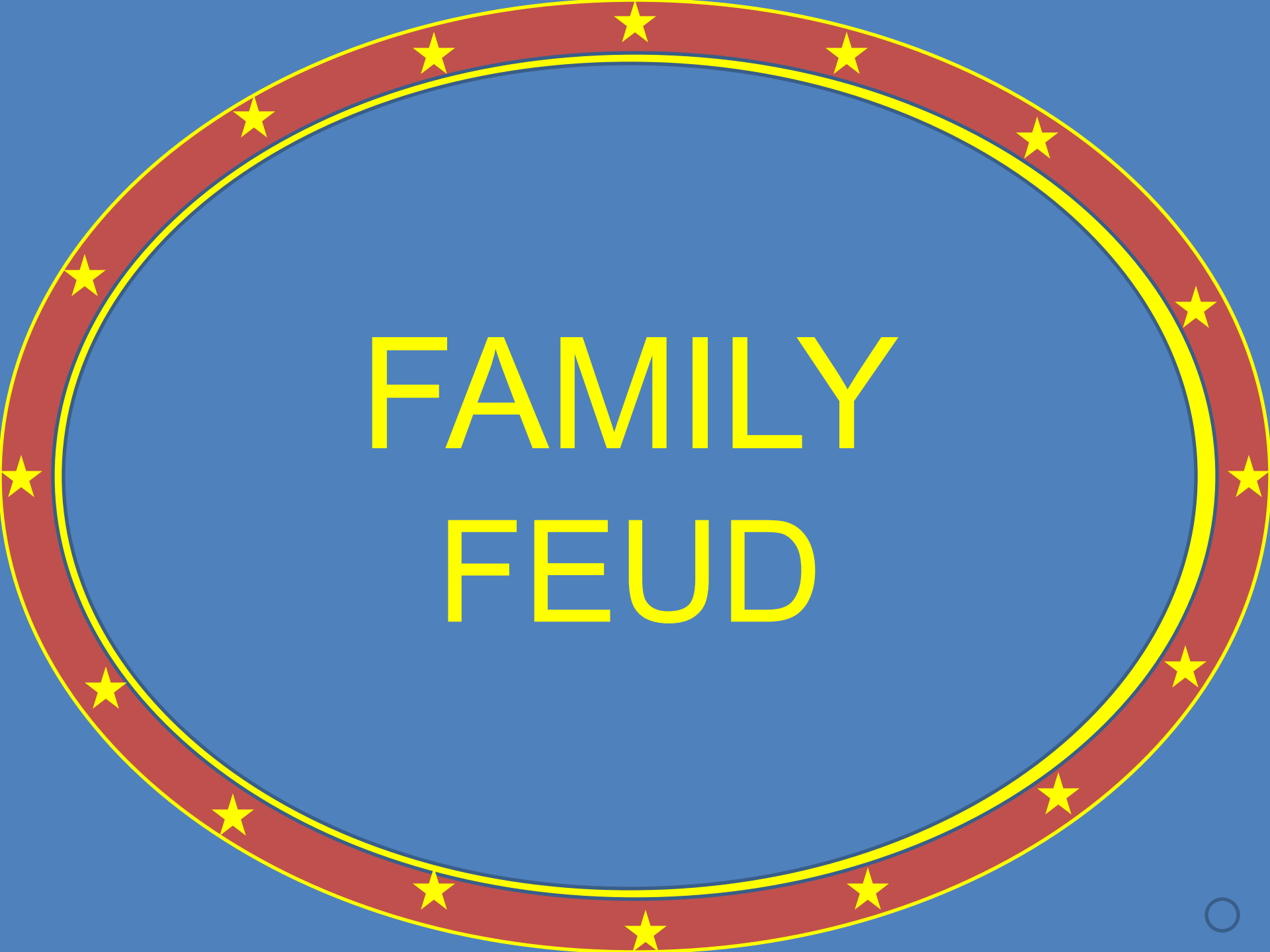


HELP



Can I call a friend?





FAMILY
FEUD



Thoughts about the Combined Wastestream Formula

What is that? (25)

How am I supposed to do that? (25)

Oh Crap (25)

HELP (25)

Can I call a friend? (25)



Toilet Bowl





XX





BROWN



YELLOW



RED

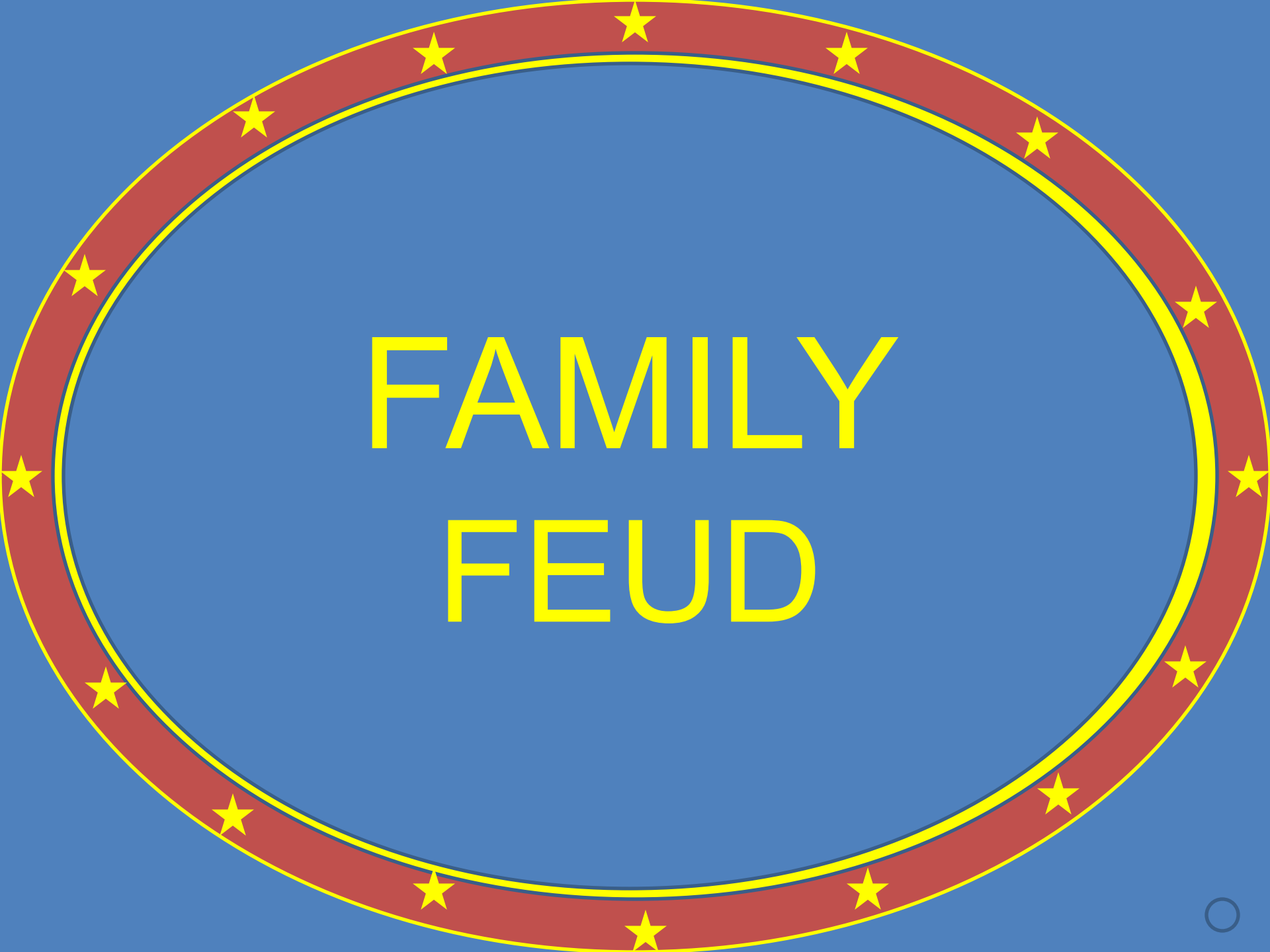


GREEN



BLACK





FAMILY
FEUD



Toilet Bowl

Brown (61)

Yellow (11)

Red (10)

Green (10)

Black (2)



Facts about the Combined Wastestream Formula

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]



XX





Alternative limit



Prior to treatment



Applicable to
categorical pollutants

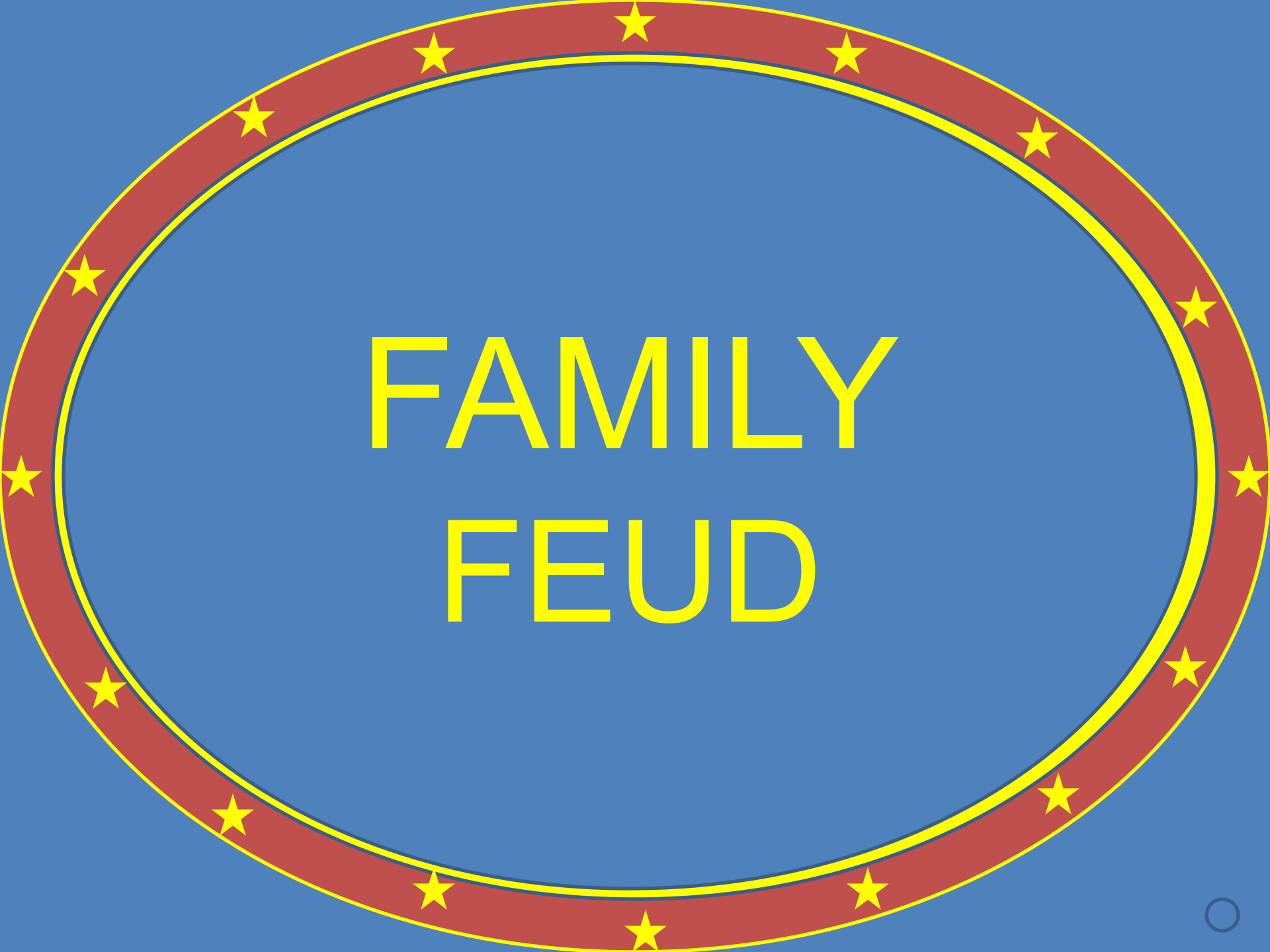


CIUs only



Combine regulated,
unregulated discharge





FAMILY
FEUD



Facts about the Combined Wastestream Formula

Alternative limit (25)

Prior to treatment (25)

Applicable to categorical pollutants (25)

CIUs only (25)

Combine regulated, unregulated discharge
(25)



Items in your Car





XX





Money/
Coins



Food/
Water



First Aid Kit

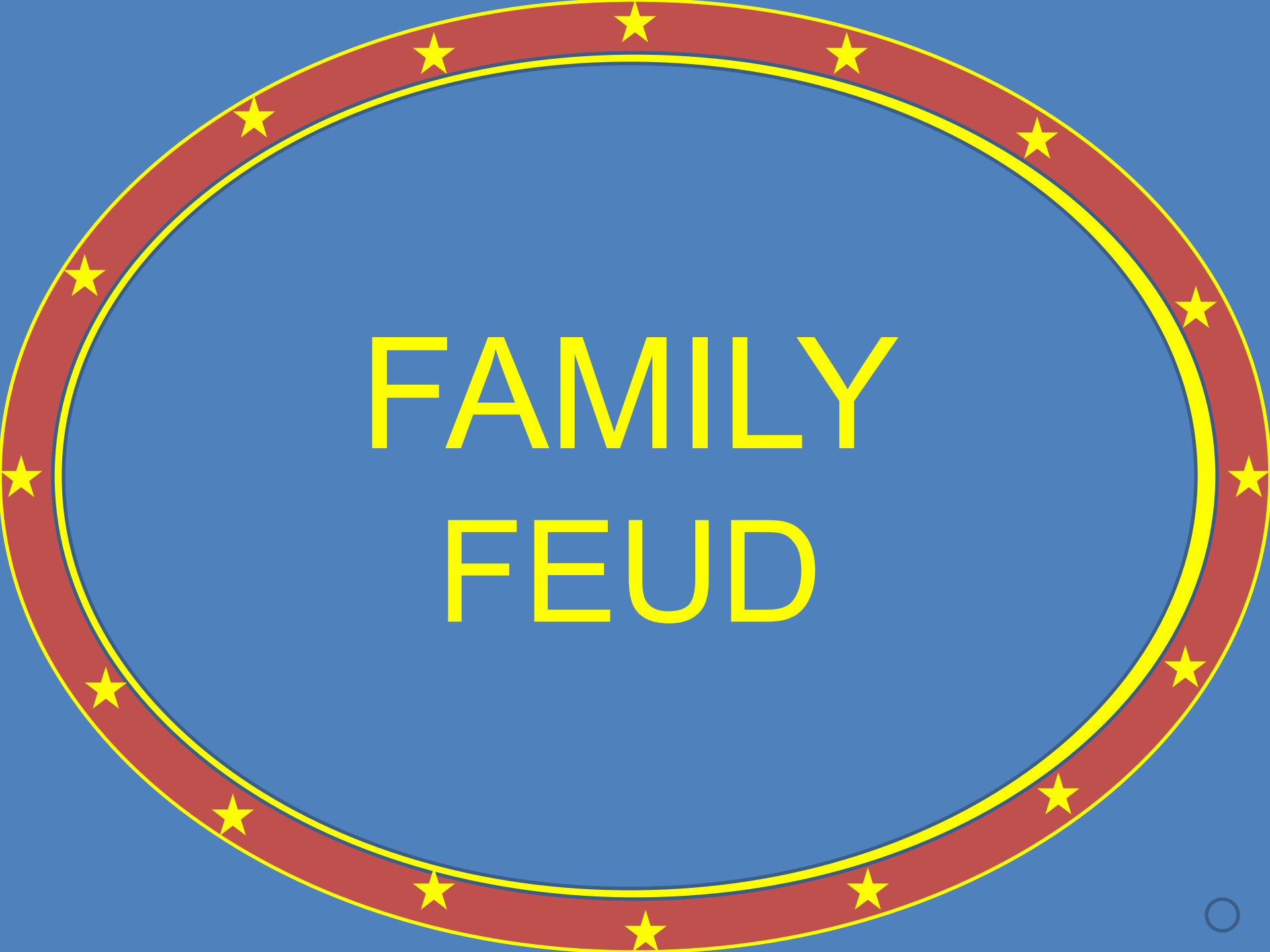


Spare Tire



Map





FAMILY
FEUD



Items in your Car

Money/Coins (19)

Food/Water (18)

First Aid Kit (18)

Spare Tire (15)

Map (7)



Benefits of the Combined Wastestream Formula

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]



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Combine and monitor
different categorical
streams



No need to treat and
sample separately



Encourage treatment of
unregulated flow

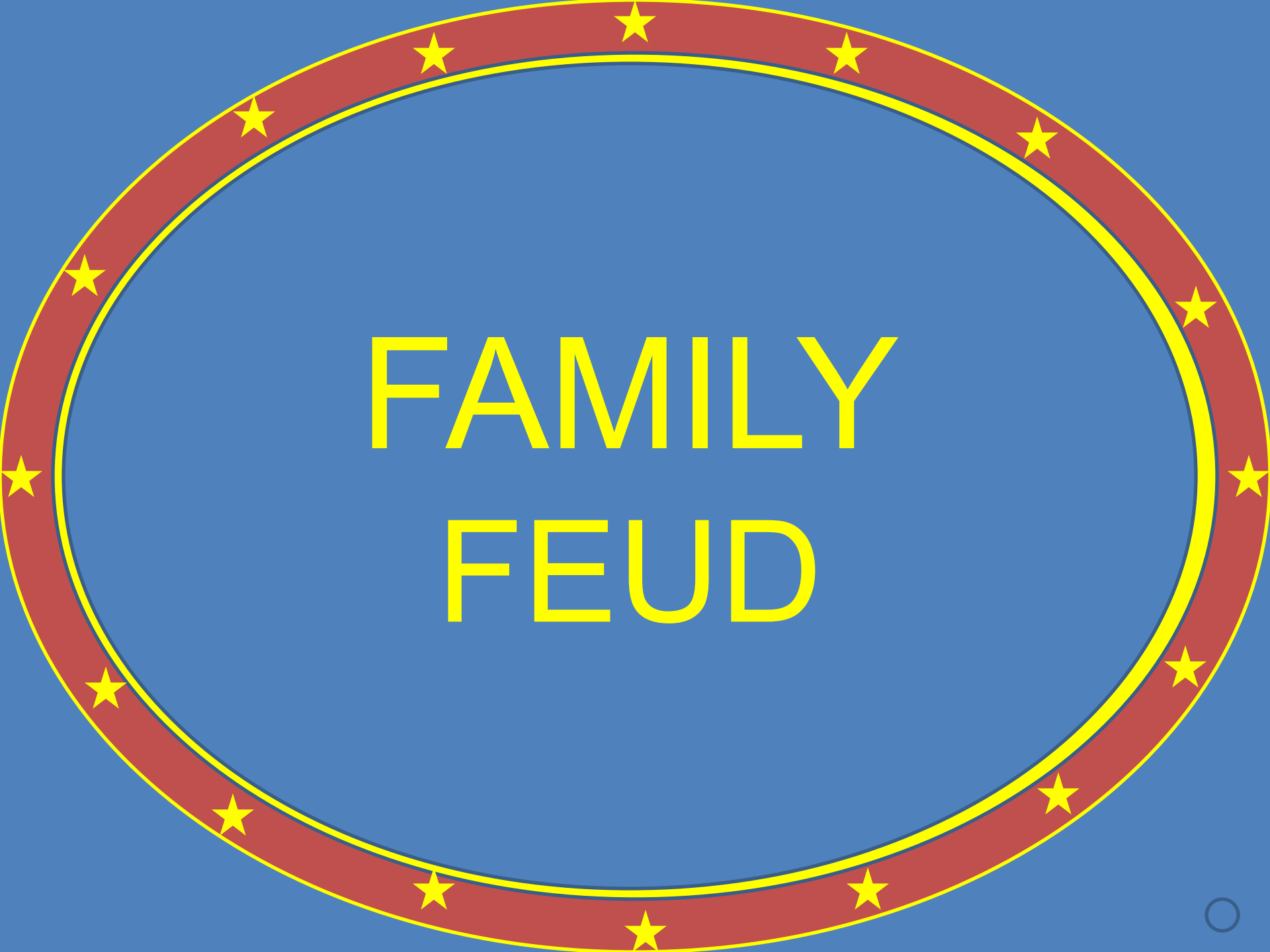


Compare categorical standards and local limits



Treat a combined flow





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FEUD



Benefits of the Combined Wastestream Formula

Combine & monitor different streams (25)

No need to treat & sample separately (25)

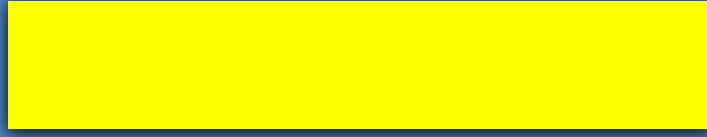
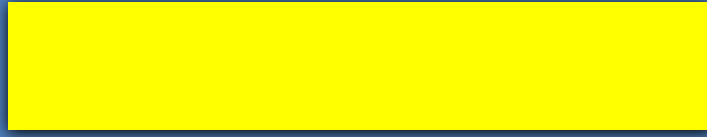
Encourage treatment of unregulated flow (25)

Compare categorical standards & LL
(25)

Treat a combined flow (25)



Cold Buildings





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Conference Room



Doctor Office



Work

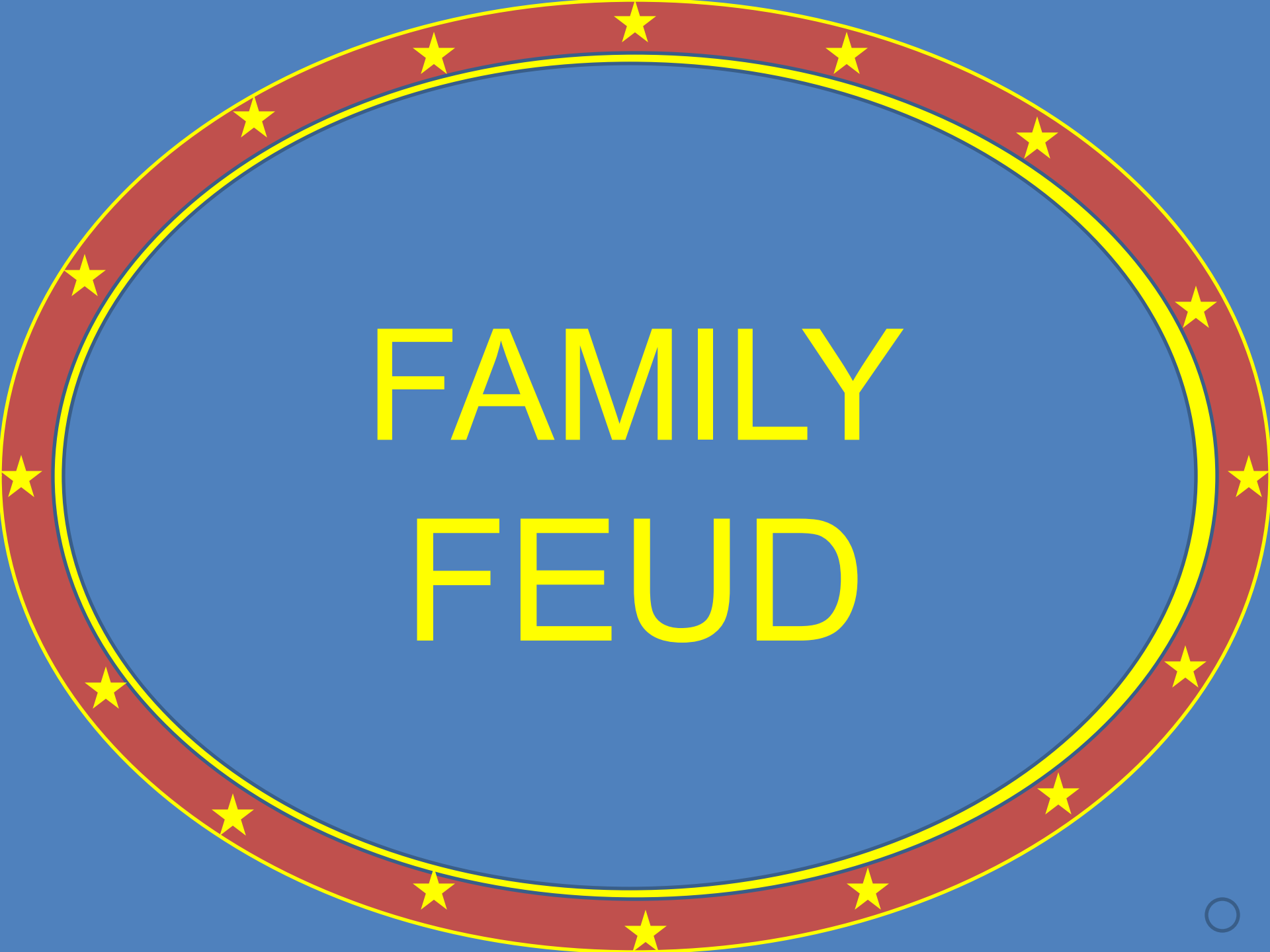


Classroom



DMV





FAMILY
FEUD



Cold Buildings

Conference Room (100)

Doctor office (44)

Work (19)

C lassroom (14)

DMV (4)



Information for the Combined Wastestream Formula

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]



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Permit application



Conduct a visual
inspection

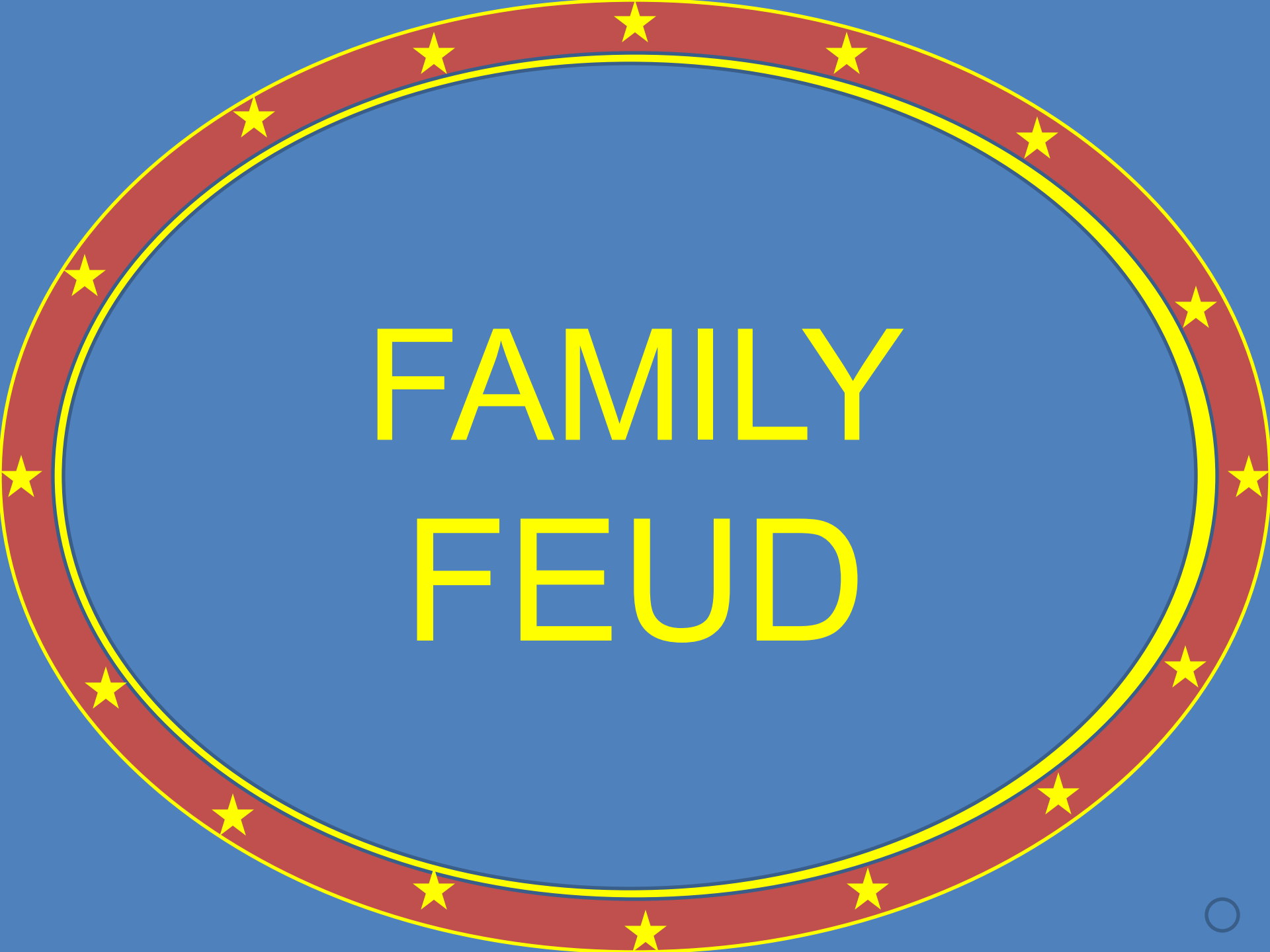


Determine the
wastestream



Flows of each
wastestream





FAMILY
FEUD



Information for the Combined Wastestream Formula

Permit application (25)

Conduct a visual inspection (25)

Determine the wastestream (25)

Flows of each wastestream (25)



Neighbors in Bathrobes





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Getting the Newspaper



Watering the Grass



Taking out the trash

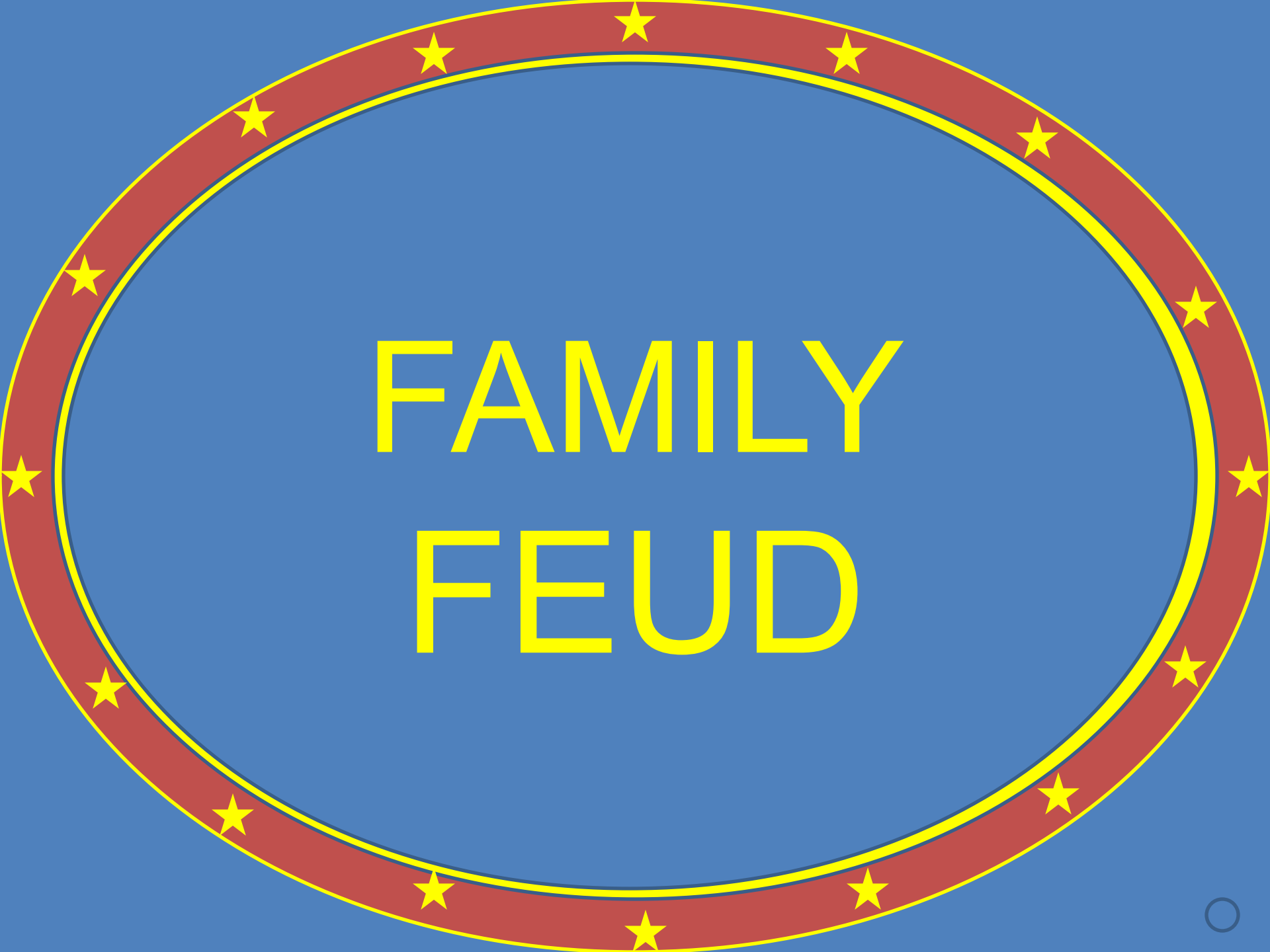


Washing the car



Kissing spouse





FAMILY
FEUD



Neighbors in Bathrobes

Getting the newspaper (25)

Watering the grass (25)

Taking out the trash (25)

Washing the car (25)

Kissing Spouse (25)



Bottom of your shoe





XX





Gum



Poop/Dog Doo

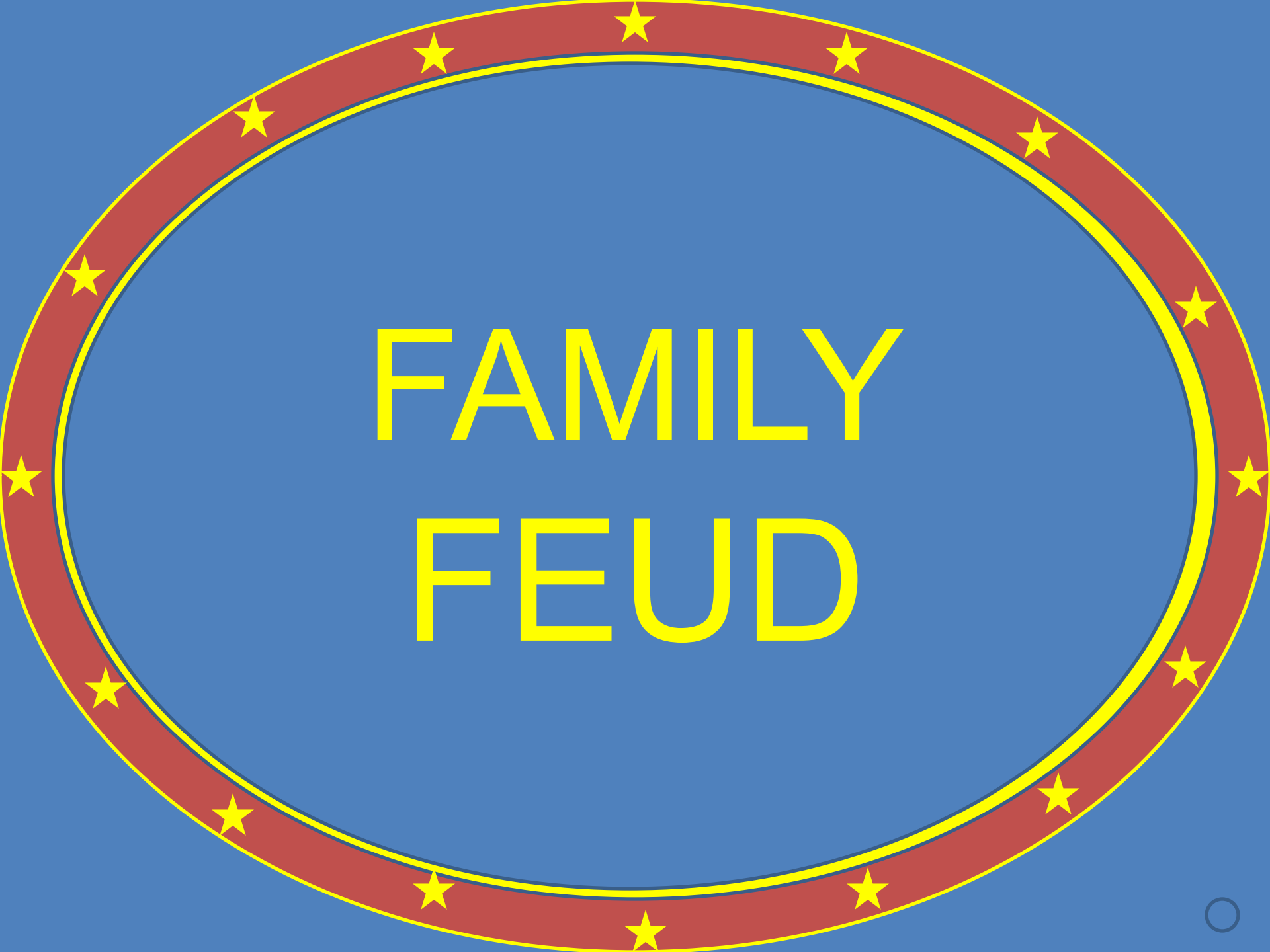


Mud/dirt



TP/Tissue





FAMILY
FEUD



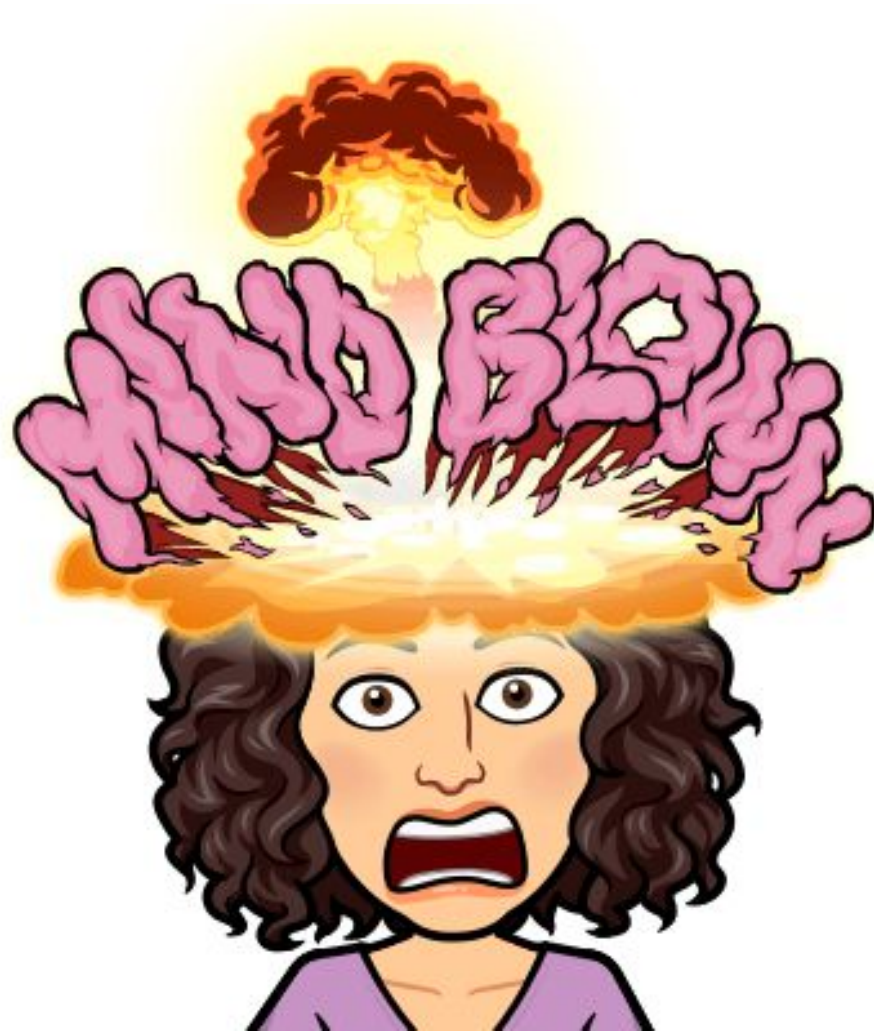
Bottom of your shoe

Gum (49)

Poop/Dog doo (43)

Mud/dirt (4)

TP/tissue (3)



What is the Combined Waste Stream Formula?

40 CFR 403.6(e)

$$C_T = \frac{\sum_{i=1}^N C_i F_i}{\sum_{i=1}^N F_i} \times \left(\frac{F_T - F_D}{F_T} \right)$$



What do you need to collect?

1. Regulated Wastestream

2. Unregulated Wastestream

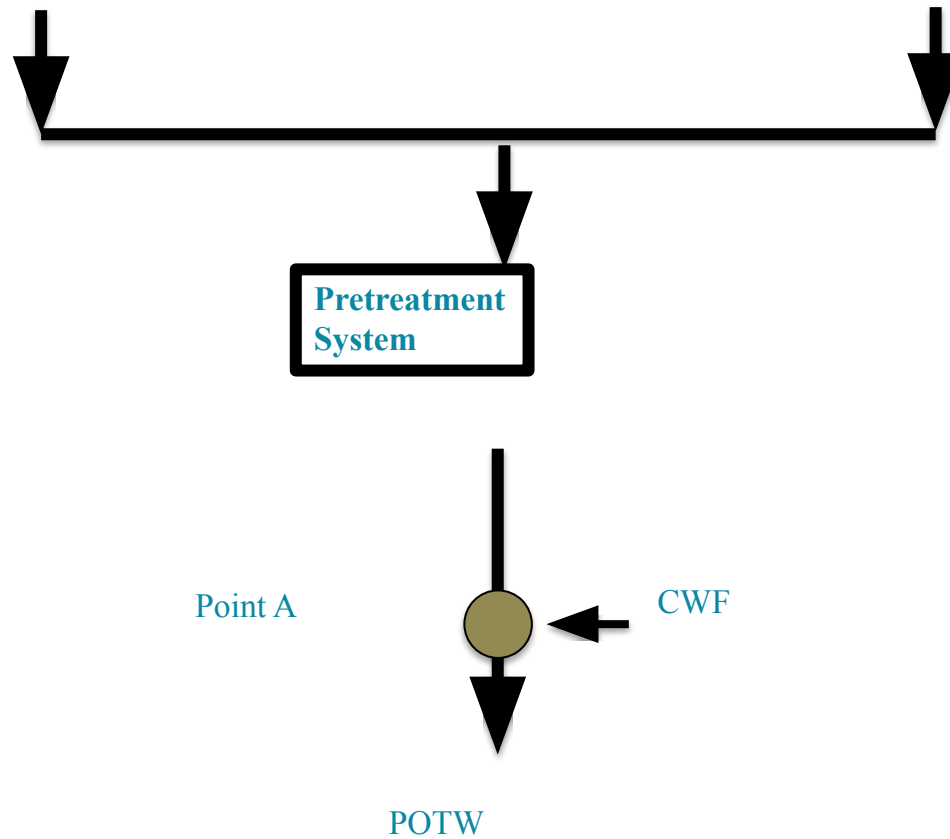
a) Dilute wastestream



Example Flow

Regulated Flow
0.02 MGD

Dilution Flow
0.003 MGD





$$C_T = \frac{\sum_{i=1}^N C_i F_i}{\sum_{i=1}^N F_i} \times \left(\frac{F_T - F_D}{F_T} \right)$$

Break down

C_T = Alternative CWF concentration limit

C_i = Categorical pretreatment standard concentration limit for regulated stream “i”

F_i = Average daily flow for regulated stream “i”

F_T = Average daily flow through combined treatment facility (TOTAL)

F_D = Average daily flow of “dilute” streams

Putting it together

(Alt Concentration limit)_{The combined wastestream} =

N (total number of regulated streams)

$\sum_{i \text{ (regulated stream)} = 1}^N (\text{Concentration based standard})_i \text{ (regulated stream)} \times (\text{Ave daily flow})_i \text{ (regulated stream)}$

$i \text{ (regulated stream)} = 1$

$\sum_{i \text{ (regulated stream)} = 1}^N (\text{ave daily flow})_i$

X $\frac{(\text{Ave daily flow})_{\text{The combined wastestream}} \times (\text{Ave daily flow})_{\text{Dilute wastestream(s)}}}{(\text{Ave daily flow})_{\text{The combined wastestream}}}$

Example

Regulated flow

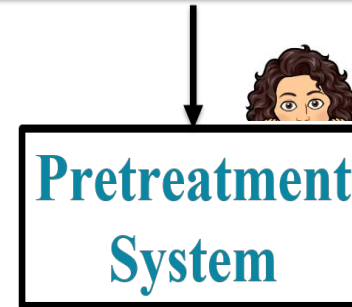
- **Electroplating**
- Flow = 0.02 mgd
- Daily Max Zinc Limit = 2.61 mg/L
- Max Monthly Zinc limit = 1.48 mg/L

Dilution

- **Sanitary Waste**
- Flow = 0.003 mgd
- Daily Max Zinc Limit = NA
- Max Monthly Zinc Limit = NA

Regulated Flow
0.02 MGD

Dilution Flow
0.003 MGD



Point A ← CWF

POTW

Example *continued*

Daily Max Zinc_{cwf} =

$$\frac{2.61 \text{ mg/L} \times 0.02 \text{ mgd}}{(0.02 \text{ mgd})} \times \frac{(0.02 \text{ mgd} + 0.003 \text{ mgd}) - 0.003 \text{ mgd}}{0.02 \text{ mgd} + 0.003 \text{ mgd}} = 2.27 \text{ mg/L}$$

Max Monthly Average Zinc_{cwf} =

$$\frac{1.48 \text{ mg/L} \times 0.02 \text{ mgd}}{(0.02 \text{ mgd})} \times \frac{(0.02 \text{ mgd} + 0.003 \text{ mgd}) - 0.003 \text{ mgd}}{0.02 \text{ mgd} + 0.003 \text{ mgd}} = 1.29 \text{ mg/L}$$

Example continued Simplified

Daily Max Zinc_{cwf} =

$$\frac{2.61 \text{ mg/L} \times 0.02 \text{ mgd}}{0.02 \text{ mgd} + 0.003 \text{ mgd}}$$

$$= 2.27 \text{ mg/L}$$

Max Monthly Average Zinc_{cwf} =

$$\frac{1.48 \text{ mg/L} \times 0.02 \text{ mgd}}{0.02 \text{ mgd} + 0.003 \text{ mgd}}$$

1.29 mg/L

$$0.02 \text{ mgd} + 0.003 \text{ mgd}$$

=



Questions



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