

47-7567 HEATING USE ANALYSIS

(BASED ON APPLICATION PROCESSING MEMO #23 (AMENDED)
and 3/25/1988 RICK STERLING MEMO)

find temperature
drop across
system

$$\Delta T_s = 0.3 (s - t) \quad \text{where } S = \text{source temp (89.6° per 12/28/82 exam notes for 47-7575)}$$

$$\Delta T_s = 0.3 (89.6 - 70) \quad t = \text{inside temp} = 70^\circ \text{F}$$

$$\Delta T_s = 5.88^\circ \text{F}$$

assume rate
of 0.04 cfs
from SRBA claim
to find BTUs for
house

$$\text{Rate (in gpm)} = \frac{E}{500 (\Delta T_s)}$$

$$(0.04 \text{ cfs}) \left(\frac{448.83 \text{ gpm}}{\text{cfs}} \right) = \frac{E}{500 (5.88^\circ)}$$

$$E = 52,782.408 \text{ BTU/hour}$$

find estimated
area of home

$$E = [e \cdot \Delta T] \times \text{Area} \quad e = .67 \text{ (average residence)}$$

$$52,782.408 = [.67 \cdot 66] \times \text{Area} \quad \Delta T = (t_i - t_o) = (70^\circ - 4^\circ) = 66^\circ \text{ Boise}$$

$$1,193.6 \text{ ft}^2 = \text{Area}$$

find volume

$$\text{Volume} = \frac{H_L \cdot DD \cdot 24 \cdot C_D}{\Delta t_1 \cdot K \cdot C \cdot \Delta t_2}$$

where

$$\Delta t_1 = \text{inside minus outside temp} = 70^\circ - (-3^\circ) = 73^\circ \text{F} \quad \text{Toin Falls}$$

$$H_L = \text{peak heat load required} = 32 \text{ for home (in BTU/hour per ft}^2)$$

$$DD = \text{annual heating degree days} = 6146 \text{ (TWIN FALLS)}$$

$$C_D = 0.6$$

$$K = 0.90$$

$$C = 2.72 \times 10^6 \text{ (unit conversion to give V in acre-feet)}$$

$$\Delta t_2 = \text{temp drop across system} = 5.88^\circ \text{F} (\Delta T_s \text{ above})$$

$$\text{Volume} = \frac{32 (1193.6 \text{ ft}^2) (6146) (24) (0.6)}{73 (0.90) (2.72 \times 10^6) (5.88)} = 3.217 \text{ ac-ft for } 1193.6 \text{ ft}^2$$