Lemma  $Sat(E(F \mathcal{U} G))$ smallest set with

(1) $Sat(G) \subseteq T$

(2) $\{s \in Sat(F) \mid Post(s) \cap T \neq \emptyset\} \subseteq T$

$(\Rightarrow)$

(A) Show $T = Sat(E(F \mathcal{U} G))$ sat. (1) and (2)

Follows from the fact that

$E(F \mathcal{U} G) = G \vee (F \wedge EOE(F \mathcal{U} G))$.

(1) $Sat(G) \subseteq Sat(E(F \mathcal{U} G))$

(2) $s \in Sat(F)$ & $\exists t \in S: s \to t$ & $t \in E(F \mathcal{U} G) \Rightarrow \begin{cases} s \in Sat(F) \\ s \in Sat(EOE(F \mathcal{U} G)) \end{cases}$

$\Rightarrow s \in Sat(E(F \mathcal{U} G))$

(B) For any $T$ satisfying (1) and (2)

$Sat(E(F \mathcal{U} G)) \subseteq T$ (smallest set with this property)

let $s \in Sat(E(F \mathcal{U} G))$

Case 1: $s \in Sat(G)$ then $s \in T$

Case 2: $s \notin Sat(G)$

Then $\exists$ path $\pi = s_0 \dots s_n \dots$
$\overset{\shortparallel}{s}$

s.t. $\pi \models \phi \mathcal{U} \psi$

let $n \geq 0$ s.t. $s_i \models F$ $0 \leq i \leq n$

$s_{n+1} \models G$.

Then: $s_n \in Sat(G) \subseteq T$

$s_{n-1} \in T$ since $s_n \in Post(s)$ & $s_n \in T$
& $s_{n-1} \in Sat(F)$

$\vdots$

$s_0 \in T$ since $s_1 \in Post(s_0)$ & $s_1 \in T$
& $s_0 \in Sat(F)$.

$\overset{\shortparallel}{s}$.

We thus showed that also in this case $s \in T$